Scientific American

A JOURNAL OF PRACTICAL INFORMATION IN ART, SCIENCE, MECHANICS, AGRICULTURE, CHEMISTRY, AND MANUFACTURES

VOL. II.—No. 5. NEW YORK, JANUARY 28, 1860. NEW SERIES.

THE INTEREST IN THE STEAM PLOW.

The attention of our inventors having been fully aroused to the importance of a steam plow, it is not probable that they will let the matter rest until some power more efficient and less costly to maintain than that of animals shall be applied to this most important of all implements. As an evidence of the interest felt all over the world on the subject of plowing by steam, we would state that the engraving of Fawkes' steam plow (illustrated in our last volume) was transferred to a number of papers in England and on the Continent, and the demand has been so great for the number of our paper containing it, that we have published *five* editions, amounting in the aggregate to over 70,000 copies! The most obvious and most formidable objection to the steam engine for the purpose of plowing is its great weight; but when the attention of mechanicians shall be directed particularly to this point, we may reasonably expect to have such modifications in its structure as will materially lessen the weight in proportion to the power which it yields. It is proper to remark, however, that many persons do not regard this as objectionable, deeming the steam engine in its present form sufficiently light for turning up the furrows; and they are accordingly occupying themselves in overcoming other obstacles, and especially in improving the plowing apparatus. The accompanying engraving illustrates a combination in which some important objections are avoided, and a plow is produced of great compactness and exceeding simplicity.

Fig. 1

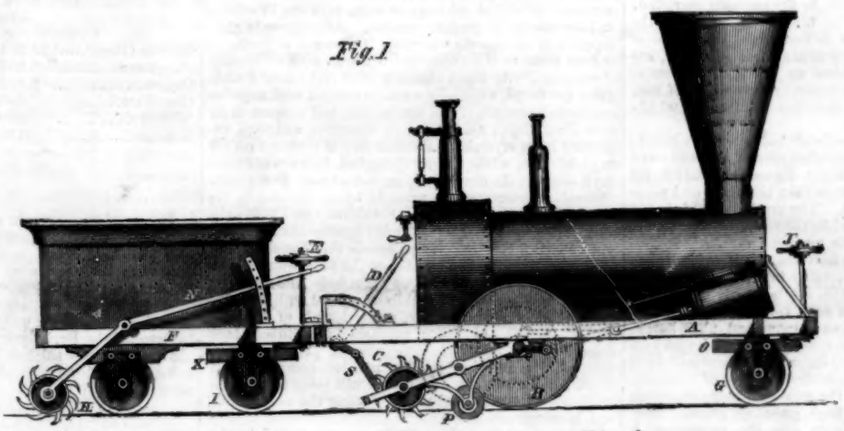
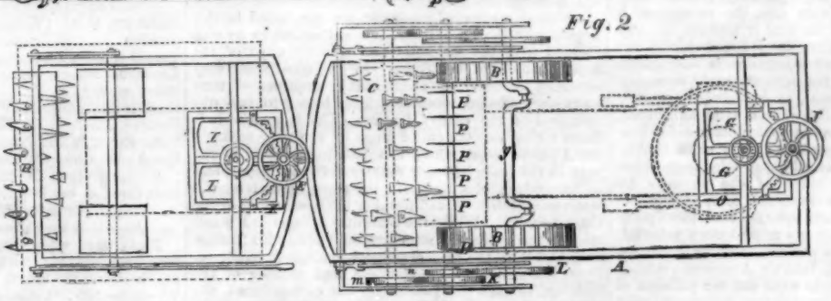


Fig. 2



HAWKINS' IMPROVED STEAM PLOW.

It consists of a shaft, P (Fig. 1), which is furnished with a number of circular knives, P P P P P (Fig. 2), and with a cylinder, C, with curved wrought iron teeth bolted firmly around it in spiral lines, as shown in Fig. 2. The cylinder and shaft are connected by the gears, L K *m n*, with the axle, Y, of the driving wheels, B B, so that they may be revolved with proper rapidity; the knives cutting the ground in thin slices, and the teeth pulverizing it perfectly. The cylinder, C, may be raised or lowered by means of the lever, D, so as to adjust the depth to which the teeth enter the earth at the will of the operator. The forward wheels, G, on the frame, O, are connected by a rack and pinion with the steering wheel, J, by which the engine is guided in its course. The tender is also steered by similar apparatus. Behind the tender is the toothed roller, H, which may be raised or lowered by the lever, N, and which operates to pulverize and level the ground.

The advantages claimed for this plow, are: first, its great compactness, allowing it to turn corners with facility; second, the equal distribution of the weight over four supporting wheels; third, a saving of power over the ordinary plow in the mode of pulverizing the soil; fourth, the facility of connecting a planter with it, so that the ground may be plowed, planted, and harrowed or rolled at one operation.

The patent for this invention was granted on Oct. 18, 1859; and persons desiring further information in relation to it may address the invent r, James Hawkins, at Braddocksfield, Pa.

THE CALORIC ENGINE.

There is an old and true saying that "he is wise who knows when to speak; but wiser is he who knows when to hold his tongue." Our neighbor, the New York *Daily Times*, does not seem to possess either of these qualities, so far as it relates to the above subject. In its issue of the 19th inst., it recurred to this topic in a leading editorial, in which neither truth nor common sense are displayed. It asserts that "this new invention is vindicating itself by actual results from the hostility of men of science and of rival interests." We assert, without the fear of successful contradiction, that not a single man of science ever was hostile to the caloric engine or its authors. The *Times* further says, "As practical commercial success is the real test of new inventions, it has upset, a thousand times, the *positive demonstrations* of scientific men." This is a piece of positive nonsense. A positive demonstration establishes a fact beyond dispute, and shows the contrary to be absurd or impossible. The *Times*, undoubtedly, is throwing ont its flings at us for the position we took in regard to the old Ericsson engine. We were right then, and are right now; the *Times* was and is still wrong.

We stated that the old Ericsson engine could never take the place of the steam engine; the *Times* asserted that "the days of steam were numbered." Well, the old caloric engines were failures; they were taken out and steam engines put in their places; and the Ericsson ship, which was to navigate round the globe with a few pounds of coal for fuel, lies rotting at the dock at Greenpoint. This "scientific demonstration" should make the *Times* very modest in glorying over its unscientific reputation.

The hot-air engine, in its present form and mode of operation, is entirely different from the old Ericsson engine. The device of the wire gauze regenerator, which, according to the *Times*, was to make the old engine so superior to the steam motor, has been laid aside, as we had suggested on page 181, Vol. XI. (old series), of the SCIENTIFIC AMERICAN; and with good results. Long ago we said that, for small powers, the hot-air engine was well adapted, and that there was a wide field for its application; but for large powers, it never can take the place of steam engines. The *Times* makes no discrimination in this particular. Its leading idea is that air a superior agent to steam, and that, for all purposes, it is fast supplanting it. As we intend to have something more to say on this feature (not in controversy) in our next number, we forbear further remarks at present, excepting to say that the actions of the proprietors of the *Times* controvert the sentiments expressed through its columns. It is but a short time since they purchased a beautiful large steam engine for driving the printing presses from Messrs. Hoe & Co., thus, by their deed, acknowledging that, for large powers according to the position we have taken) the air is not equal to the steam engine. For economy of fuel in steam engines, we call the attention of our readers to a letter on another page of this paper (68), wherein the statistics are given to show that a steam engine can be run daily for 8 54 cents only, as expense for fuel per horse-power. We are sure that neither the *Times*, nor any other paper, can furnish facts to disprove a single sentiment we have expressed on hot-air engines. Though devoted to practical science as a profession, we do not pretend to be above committing mistakes, or that we know all things; but surely, if there is any value in knowledge, the opinion of those devoted to such investigations must be more reliable than that of those who acknowledge the want of such information.

POLYTECHNIC ASSOCIATION OF THE AMERICAN INSTITUTE.

[Reported expressly for the Scientific American.]

On Thursday evening, the 12th inst., the usual weekly meeting of the Polytechnic Association was held at its room in the Cooper Institute, this city; C. Mason in the chair. The pre-arranged subject for the evening was "Franklinite," regarding which two reports were read, as follows:—

CHEMICAL REPORT.

The discrepancies in the chemical analysis of Franklinite are undoubtedly due to the fact that varying samples were taken. Pure Franklinite is a mineral of as definite a constitution as water. A careful comparison of the analysis and of the mineral with various isomorphous compounds, files upon the formula (Fe O, Zn O) + (Fe O3, Mn2 O3), as exactly representing the composition of Franklinite. The following formula shows, in round numbers, the relative weight of the elements: O 64, Zn 32, Fe 84, Mn 56; and if the oxygen be eliminated, we have the proportion of metals in 100 parts: Zn (per cent) 18, Fe 49, Mn 33; the iron constituting one-half of the whole, the manganese one-third, and the zinc one-sixth. But it is evident that, in no smelting process, could such alloy of such composition be produced. Zinc is volatile at a low red heat, and any alloy of which it forms a part would soon lose the whole of that metal at a temperature near the melting point of iron. It must therefore be concluded that zinc cannot be found in any notable quantity in the pig metal reduced from Franklinite.

In the mineral, the manganese is two-thirds the weight of the iron; should this proportion be maintained throughout the reducing process? Manganese readily alloys with iron neither metal is volatile. But manganese has a far stronger affinity for oxygen than iron, so that if the alloy be exposed at a high temperature to oxygen, the manganese is more or less converted into oxyd, while the iron is unchanged. In the smelting operation, then, as the condition of the high temperature of the alloy with excess of oxygen is found, the proportion of manganese will be materially diminished. In short, analysis of Franklinite pig shows an average decrease of about seven-eighths of manganese. The amount of loss, it is evident, in practical operation would vary within pretty wide limits.

The fact that the ore actually worked is not pure Franklinite, but contaminated with red oxygen of zinc and oxyd of iron, is of little weight in the discussion thus far, for the reason that no other metals than zinc, iron and manganese are found in the ore. The proportions of zinc in the ore are most variable; while the relative proportion of the iron to the manganese is more constant.

If the ore be wrought for iron only, it is evident that the zinc would behave unfavorably in consuming fuel for its reduction and sublimation, but favorably in conveying out of reach of the iron such volatile impurities existing in the fuel and flux as sulphur and phosphorus. The manganese would act favorably by uniting with silicious and other fixed impurities, which otherwise would contaminate the iron. Moreover, the oxyd of manganese readily combines with the flux and slag, rendering them more fluid. In the final puddling process, especially when mixed with other ores, the manganese is speedily removed, while all the time it protects the iron from all injurious foreign matters. It hence appears that a certain amount of zinc and manganese is desirable in an ore which is worked for the purest wrought iron.

The Franklinite pig metal, as ordinarily produced, should be regarded as an alloy of iron with manganese. It deserves this distinction as well from its peculiar properties as its chemical composition. It is more fusible, less oxydable, harder and of a lighter color than either iron or manganese. For many of the purposes for which ordinary cast iron is used, this compound is impracticable; while, for certain specific uses, the Franklinite pig is better fitted than any other known material. We have in this alloy a new raw material for the industrial arts. Its sources are exclusively American; science and American industry should work out the problem of its application.

DR. STEVENS.

GEOLOGICAL REPORT.

In the great uplift of hypogene and metamorphic rocks, which forms the great determining contour of the Atlantic slope of the North American continent, there was revealed to the research of man, for his economic uses, the largest extended reach of metalliferous rocks known on the face of the globe. It extends from Canada through the New England, middle and southern Atlantic States, in elevated mountain ranges, having a northeast and southeast trend, and sinking below the general level of the country, is lost in the northern part of the Gulf State of Alabama. Throughout its entire extent it is rich in metals, the more important of which are gold, silver, lead, copper, zinc and manganese. Gold is sparsely distributed; manganese is common; iron is abundant throughout all this range of rocks, while zinc is confined to a few localities. In the town of Franklin, Sussex county, N. J., within 70 miles of the great commercial metropolis of our country, is found the only locality of ore where the three metals of iron, manganese and zinc, known as Franklinite, are molecularly combined, and either monometrically or amorphously crystallized. Its precise position, geologically, is in a belt of altered granular limestone, resting uncomformable to a syenitic rock below. A section of this belt of limestone, where it enters the State of New Jersey from New York, gave the following as the descending series (made by Professor Wm. Kitchell):—

6.	Limestone of a dark blue color, granular silicious, with calcite.....	150 feet
5.	Limestone of blueish gray color, compact, with numerous seams of quartz.....	120 feet
4.	Limestone of a light blue color, with silica	65 feet
3.	Limestone of a dark blue color.....	120 feet
2.	Limestone of a dirty blue color, crystalline	30 feet
	Total limestone.....	485

Gneiss, as seen dipping southeast of east, 20° 50′ 5″

Limestone uncomformable to the gneiss dips to northwest from 20° to 25°.

Francis Alger, Esq., of Boston, Mass., thus describes this interesting locality:—"The ridge of granular limestone commences at Sparta and runs through Stirling to Franklin. The zinc ores extend from Franklin to Stirling and no further, and are found again in Pennsylvania. Sometimes large masses of gneiss and limestone appear including large and shapeless deposits of magnetic ore. On the east side of Stirling Hill, after penetrating limestone, seven feet of Franklinite and red oxyd of zinc appear in about equal parts. Six inches of heavy coarse crystalline limestone separates from ten to twenty feet of regular pure Franklinite ore, sometimes crystallized in the cavities or against the back face of the dark limestone. Behind the bed of ore are limestone strata until we reach the body of gneiss in the hill."

Dr. Jackson describes the beds of Franklinite at Stirling Hill as averaging 32 feet wide, and the zinc at 18 2-3 feet through the hill, and the hill 167 feet high, having limestone above and gneissoid rock below.

Professor Hodge gives an anatomy of the deposit:—At Stirling Hill it forms the main substance of two large beds, separated from each other by a seam running southwest and northeast, and dipping southeast 40° from the hill against which the beds seem to repose. The upper part of the beds lie under crystalline limestone, and are composed chiefly of red oxyd of zinc, with the Franklinite interspersed in granular masses. After assuming the appearance of imperfect crystals it presents a thickness of from three to eight feet, and is traced with uniformity of structure. At times almost perfect crystals of Franklinite are found, especially when in contact with superincumbent limestone. The underlying bed appears to be pure Franklinite, amorphous in structure although exhibiting large crystals of Franklinite; it contains no red oxyd of zinc, while the overlying bed is known as red oxyd of zinc. As the underlying bed of pure Franklinite descends it becomes less pure, it being replaced by the crystalline limestone, with the Franklinite and Willemite (anhydrous silicate of zinc) thickly interspersed in grains and imperfect crystals. It preserves this feature as far as known, which is 200 feet below the outcrop. Several hundred feet westward of these main beds, and higher up the hill, another bed of Franklinite, mixed with red oxyd and silicate of zinc, runs the entire length of the hill. On Mine Hill, 1½ miles northeast of Stirling Hill, Franklinite is found in large masses. There are two distinct beds, and their relative position compared with Stirling Hill is reversed, the Franklinite being the easternmost and uppermost and the zinc being the westernmost and lowermost.

Although masses of magnetic ore are found in this locality with the Franklinite, this bed is not to be confounded with the magnetic and specular oxyd of the hypogene rocks of this State. In geological space they are many thousand feet apart, and in sequence of time *ages-aeons*—beyond compute. They belong to two distinct eras of the earth's history. The magnetic ore is found throughout the entire range of hypogene rocks of the Atlantic slope, which re-appear in Missouri to the west, in the Lake Superior country to the northwest, and in Adirondack Mountains to the north, underlying the intervening territory, and forming the foundations of the United States. While the limestone appears as a water table to the geological structure built upon this foundation, and it is the best developed geological structure. From the crinoid of the Taconic and mollusc of the Silurian, through the palæozoic, the carboniferous, the permian, the reptile-yielding cretaceous, the mammalian, tertiary of Nebraska to the human of Gaudaloupe, no system is wanting—the structure is entire. In this water table of limestone, the Franklinite appears, in this single locality, as an ornament of nature—a geological curiosity—a source of mineral, economically and commercially considered—as the most abundant source of pure, elegant and health-preserving pigment. It is rather as an ore of iron than zinc that it is to be considered in this report, and its history we will very briefly give.

As early as 1640, a party of Nassau miners discovered it, who came from New Amsterdam, N. Y., and explored the range of ores from the line of Pennsylvania to Salisbury, Conn. In 1770, it was examined by Lord Stirling and samples sent to Europe. In 1817 it was owned by Dr. Dowler, a mineralogist. Dr. Keating and Professor Vannuxen examined it in 1819. Dr. McClure, the father of American geology, in company with Dr. Jackson and others, explored it in 1825. Dr. Jackson revisited it in 1849, accompanied by Francis Alger, Esq., of Boston. In 1850 zinc was extracted, and in 1852 iron was successfully reduced from the ore. During the prosecution of the geological survey of the State, made by Dr. Rogers, he also reported upon this. In the recent survey by Dr. Kitchell, an elaborate report is given upon the ores and mines of the State, and this locality is carefully described.

It was first chemically analized by Berthier. From recent analyzation the per cent of iron is uniformly 66. The zinc ranges from 12 to 30, and the manganese from 7 to 21. The discrepancies of the analysis may be accounted for by the different varieties of specimens.

Dr. Jackson made an analysis which is considered fair, as follows:—

	No. 1.	No. 2.
Silica.....	0.280	0.127
Oxyd of iron.....	66.082	66.115
Oxyd of zinc.....	21.395	21.771
Oxyd of manganese.	12.243	11.987
	100.000	100.000

Berthier expresses it atomatically in the following formula:—

4 atoms per oxyd of iron,
1 atom sesquioxyd of manganese,
1 atom biferate of manganese.

The specific gravity is from 5 to 5.09; hardness, 5.5 to 6.5. When the ore is in contact with or influenced by the hypogene rocks, it is slightly magnetic.

In reducing the ore manganese is mostly driven off by volatilization, while the zinc is collected as a white oxyd at the top of the furnace in bags and preserved as a pigment. From the residuum a pig metal is yielded 33 to 37 feet. The pig in fracture presents the following peculiarities:—The center of it is a mass of large crystals having broad folia of lamination with well-defined edges, of intense hardness, scratching glass and cutting it. It has a silvery lustre, with thin dark lamination. Near the circumference it has the appearance of white pig, and close and granular in structure. Often the center of the pig is honey-combed as if the metal had flowed out from the walls of crystal; but examination finds the walls of the crystals to be perfect, showing that they were never filled. It melts at a lower temperature than common pig and welds at a low red heat, showing it to be more of the nature of steel than cast iron. Its specific gravity is 7.665 at 60° Fah. (Hays).

ANALYSIS.

Charcoal Pig.		Anthracite Pig.	
Ferrum (Hays).....	93.364	Ferrum (Hays).....	88.30
Manganese.....	3.204	Manganese.....	4.50
Carbon.....	2.250	Carbon.....	5.48
Slag silica.....	.640	Slag silica.....	.20
Alumina.....	.240	Sulphur.....	08
Lime.....	.170	Phosphor.....	.15
		Zinc.....	.30
	100.000	Loss.....	.99
			100.00

The maximum amount of carbon that steel is capable of taking up is 1.90 (Karsten). Specular pig metal is 5.25 to 5.75. It will be seen that pig from Franklinite only exceeds that of steel by 0.35 and falls below that of common pig by 3.50.

No trace of sulphur, zinc, chromium, vanadium or any other impurity, save a little phosphuret of calcium, could be detected by Dr. Hayes in the charcoal reduced pig, showing that the sulphur and phosphorus of anthracite reduced metal must have been received from another source.

ADDENDA.

Tensile strength of various iron (square inches):—

Salisbury, Conn. (Walter R. Johnson).....lbs.	58,000
Sweden.....	58,000
Center county, Pa.....	58,000
Lancaster county, Pa.....	58,000
Essex county, N. Y.....	58,000
English cable bolt, E. V.....	59,000
Russian.....	76,000
Carp River, Mich. (Maj. Wade).....	89,582
Franklinite (John A. Dalghren).....	66,000

Fredgood states the strength to be as follows:—

Best Swedish bar iron.....	72,840
English bar iron.....	61,660
American Franklinite.....	77,000

Franklinite, when mixed in proportion of ¼ with common anthracite pig, with a small proportion of Scotch pig, increases the tensile strength of the casting about 80 per cent—100 feet (Cady, Cornell and others). A mixture of Cloverdale pig (a sort of chemical pig) 10 parts, and Franklinite pig 1 part, gave a tensible strength of (square inches) 28,200 lbs., with intensity of 78·24.

JOHN A. DALGHREN.

DISCUSSION.

Dr. Stevens read chemical tests of Franklinite, showing its superior qualities to those of iron.

Mr. Johnson said that Franklinite fused at a higher temperature than copper, and that was an objection.

The president exhibited a bar of iron, composed of 80 per cent of magnetic and 20 per cent of Franklinite ore, from which horse-shoes and nails are made; and also two other bars of different degrees of porosity and fineness. Their tenacity, strength and flexibility were yet to be considered.

Mr. Curtiss said that the workmen (in Morris county, N. J.) called it "hard and frizzly." It breaks easily and shows the effect of silicates upon ore. Horse-shoes were made by the second heating, and manufacturers say it is less liable to cracks and flaws. Ax-blades were superior that had been made from it.

Mr. Pomroy (a smelter) said that Franklinite had an

affinity for sulphur and oxygen. Zinc takes up the sulphur from the ore. In smelting it becomes granular because it is not sufficiently scorified; it is always a semi-steel. The zinc is taken off by anthracite coal and charcoal takes up the sulphur. An oxyd of zinc in a flocculent form is a product and passes off. The oxygen and carbon combine and form carbonic acid, and thus produce a mineralizer, a chemical compound between the impurities—the bases of the earthy salts; and the iron is not scorified. A stream of water or steam is let in and acts on the carbon to combine with the oxygen to produce its hydrogen. The hydrogen will take up the carbon and leave it entirely soft and pure. The hydrogen and zinc (both contaminating principles) are taken up and removed. A metal is then made which is graduated in quality according to the degree of temperature. Sulphur is a principal compound for mineralizing, and Franklinite requires a great amount of heat, and is therefore expensive. A little Franklinite was sprinkled in the puddling furnace, with which the iron of the blasting furnace combined, producing a purer quality.

The president remarked that there was a great resemblance in structure between a bar of iron and wood; the operation of lengthening the fibers in each case was similar, as was also their comparative quality.

Mr. Seely said that the president had anticipated his idea of the composition of Franklinite. The scorification was very easy compared with smelting. If Mr. Pomroy has found that hydrogen has a greater affinity for carbon than oxygen it is valuable. The zinc was not so difficult to remove as the manganese. There was a remarkable fact that at a high temperature iron is not oxydized, but the manganese is oxydized. He wished to determine what effect the different proportions of manganese in the Franklinite have on fusibility and hardness; also whether it is possible to make an alloy of manganese and pure iron without carbon. A scale of manganese would become soft if submitted to a crucible.

Mr. Tillman considered that carbon had a greater affinity for oxygen than any substance under the force of heat.

Mr. Seely then said: "Take charcoal at red heat and pass over it vapor of water, which decomposes. The hydrogen will unite, or the oxygen may unite; and one has as great affinity as the other."

Dr. Reuben introduced the subject of illuminating gas. By experiment, hydrogen and oxygen, at a high temperature, united with carbon; then the oxygen and hydrogen separated from each other and united with the carbon, producing an illuminating gas. Professor Sanders passed vapor of water over carbon at a high temperature and obtained a carbureted hydrogen.

Mr. Garvey did not know that carbureted hydrogen was made for illuminating.

Mr. Seely said it was an old statement, and known as water gas.

Mr. Garvey (returning to the subject of Franklinite) said he did not know why the metal would not be strengthened by manganese.

Dr. Reuben replied that the results are to be found in statistics. The alloys of copper and zinc have greater strength than either of the metals; and they acquire greater strength in proportion to the mixture of zinc which by itself is a weaker element. Steel is not pure iron and it is the strongest metal. It is found that tungsten increases the strength of metal, and sustains more than ordinary alloy. Calvert Johnson, of England, says that alloys, to a certain per cent, are the strongest. It is not small atoms creeping into large ones, as stated, but the power of aggregation or cohesion that gives strength. We may take sulphuric acid and water and press them into a volume, and affinity binds them; and it is very easy to suppose that there is an affinity.

Mr. Pomroy said that if hydrogen and carbon did not combine, there would be no gas-light. He was investigating Franklinite continually and produced new conclusions. The zinc took up the oxygen and semi-steel was made. Hydrogen is then introduced to take up the carbon; the oxygen and the carbon are removed, and the base of carbonic acid is destroyed. He had divested the iron from these gases.

Mr. Nash wished to know whether alloys of zinc and copper were not made by electrical action; and if hydrogen and oxygen could be manufactured into water unless by combining electricity.

Mr. Pomroy considered a course of lectures would give some light on it.

Dr. Dick stated that in England an ore was used, like a species of Sweedish ore, which might bear characteristics similar to Franklinite.

Mr. Butler had made an experiment and found an electrical effect. Thus: he partially melted a bar, and on examination afterwards found scales, dissimilar from the soft original which were tough.

Mr. Curtiss said that the Pembroke iron of England has 12 per cent of Franklinite, and was made into chain cable. So in America, at Albany and New York city, water pipes had a certain per cent of it. He had compared bars with a certain per cent of Franklinite and those without, the latter being more brittle.

A motion was carried to refer the whole matter to a committee (of which the president was acclaimed chairman), to make a general report at the next meeting.

[We advise the members of the Polytechnic Association not to be so rambling in their discussions hereafter; because it is exceedingly difficult to understand what some of them mean, as their ideas are either very far from being scientific in their character, or the language employed to communicate them is inappropriate.—Eds.

DEFECTS OF CALF-SKIN LEATHER.

We have heard of persons purchasing several pair of boots at once, in order to lay some of them away for long keeping, under the impression that leather when kept in a dry situation improved in quality by age, like oil-cloth. Upon inquiry we find that such notions are very generally entertained, but why this should be so we cannot imagine, for they are the very reverse of all facts and experience in the case; and we call attention to this question for the first time, we believe, as "a word of warning." Calf-skin leather, instead of improving in quality with age, when made into boots, deteriorates rapidly. It is subject to a species of dry rot—eremacansis; and in the course of three years it becomes as tender as a piece of brown paper. Dealers in boots and shoes experience a considerable loss from this cause when such articles are left on their hands for more than two years. This dry-rot in calf-skin boots first appears at the edge near the soles, in the form of a black glassy sweat, resembling varnish, and from thence it gradually proceeds until the whole leather becomes rotten. The application of grease rather accelerates than arrests the progress of this decay; such leather endures much longer when worn on the feet than when laid aside in a dry situation, but whether this decay is caused by the grease used by the curriers, or is some peculiarity in the skin, is not known at present. Cow-skin and kip leather do not seem to be subject to this rapid deterioration, but all kinds of calf-skin, even the very best French, is just as subject to it as the poorest qualities.

This is a subject deserving of practical scientific investigation in order to discover some remedy for the evil. At present the practical application of this information by purchasers of calf-skin boots and shoes is an easy matter—be careful not to buy aged articles.

Value of our Forests.—The Baltimore *Exchange* says:—"Those persons who have been accustomed to regard the pine forests of the South as of little commercial importance, will be surprised to learn that the annual value of the hewn timbers, the sawed plank, boards, scantling, resin, pitch, and turpentine, is estimated to be not less in the aggregate, than from twelve to fifteen millions of dollars." This estimate is probably far too low for the present, and certainly falls far short of what may be expected in a few years, when the fact is demonstrated that no point where timber is abundant is inaccessible to the wants of commerce. It appears that the forests constitute not only the staple product but the real wealth of North Carolina. Her tar, pitch, and turpentine, are used in every corner of the globe The amount shipped to England during the year 1859 is valued at $2,176,870.

Zinc Nails.—These are now extensively employed in the manufacture of boots and shoes in place of wood or iron. It is said that zinc nails are also substituted for sewing in ladies' slippers. An iron last is employed, and the nails, on being driven in, strike the last and become headed or riveted on the inside, thus forming a very secure fastening.

OIL FUEL FOR STEAMERS.

Messrs. Editors:—In the last number of the first volume of the new series of the Scientific American, there are some very original and sensible opinions expressed on the important subject of coal oil for ocean steamers, yet I think one of the largest items of economy has been rather cautiously dealt with. I assume, without fear of successful contradiction, that one pound of coal oil, properly consumed and the heat economically distributed through the furnaces and flues of the boilers, will evaporate as much water as four pounds of coal. I am of the opinion that there will yet be such boilers constructed, and such combustion effected, that coal oil will be largely used as fuel in steamships and for fire and other engines, where great economy of space and weight are important. All that is requisite for inventors in this field is to distribute sufficient warm air among the gases generated from the oil, so as to effect complete combustion in the furnace. The heat generated must also be applied economically, so as not to allow so much of it to escape up the chimney, as is now the case in most instances where steam power is employed.

Let us suppose the fire-box of a furnace to be constructed with corrugated plates, to take up considerable of the space now required for the burning coal, and that instead of grate bars a perforated bottom plate for small vertical tubes, placed close together and secured by screws or otherwise, to extend about three inches upwards. Now, let the spaces between these tubes be filled with pumice-stone or other incombustible loose material, and let the oil be fed towards the surface to within half an inch of the top of the tubes. When properly ignited and the furnace highly heated, as the oil rises near the surface of the porous material it will be converted into gas, and when it has received its full complement of warm air from the chamber below the tube plate, and through the tubes, perfect combustion will be effected, both with the carbon and the hydrogen of the oil. This is an important subject both for chemists and mechanical inventors, and it will yet bring out some important results.

If one pound of oil can evaporate as much steam as four pounds of coal, of course steamships in which it would be used for fuel could carry a much greater amount of freight, as you have stated in the article referred to. In a large steamer consuming 100 tuns of coal per day, for 11 days steaming between New York and Liverpool, no less than 825 tuns of extra space could be applied for cargo, as 275 tuns of oil would be all that was required. A vast economy would thus result from the use of oil in steam navigation. The large fields of cannel coal situated in different parts of the country will yet, I believe, supply much of the fuel for generating steam, especially for long voyages, where the economy of space is an important consideration.

J. E. H.

Newark, Ohio, Jan. 21, 1860.

Gum-chewing.—The Utica *Herald* gives the gum statistics of Jefferson county, N. Y. It makes our jaws ache, now, to think of such gum-chewing. It says:—"Probably few persons outside of Watertown are aware to what an extent the manufacture of chewing gum is carried on at that place. O. G. Staples, the 'gum man,' who keeps some twenty hands constantly engaged in its manufacture, informs us that in the six months ending Nov. 15th, he had manufactured and sold over 35,000 boxes—each box containing 200 sticks or rolls—making a total of 7,000,000 rolls. Allowing four chews to a roll, which is a fair estimate, this would give a 'chaw' each to 28,000,000 persons. Think what an army of gum-chewers this would be! We infer from these figures that gum has become somewhat of a staple article."

An Inventor Creating a Sensation.—At the President's levee, last week, a stranger in the room attracted considerable attention by the peculiarities of his attire, which consisted of a military uniform, with a silk scarf thrown over his shoulders. It was said that he had come to Washington as an applicant for a patent for a steam plow, and that his brilliant costume was worn in accordance with the advice of some of his boarding-house acquaintances, who suggested to him that, to succeed in securing his patent, he must make himself somewhat prominent in Washington society, and thus attract the attention of the influential politicians.

A BEAUTIFUL DYE FROM COAL TAR.

The attention of calico-printers and of woolen and cotton manufacturers throughout the world having been for some time directed to a new, beautiful, and permanent violet dye which is obtained from coal tar, we presume many of our readers will be interested in the following article which we translate from *Le Gaz*, of Nov. 15, 1859, and which contains a brief description from the largest French manufacturers of their mode of producing this new and valuable dye. Is there not an opening for a profitable enterprise in its manufacture from the refuse of our own coal oil and gas-works?

Among the sub-products which are obtained in the manufacture of illuminating gas, there is one, coal tar, which enjoys the privilege of endowing, from time to time, the industrial world with some new substance which signalizes its advent by a marked step in the progress of the arts. We borrow from our colleague, Doctor Quesneville, an article full of interesting details, which he has just published, on the application of nitro-benzine to the dyeing of cloths.

The attention of the industrial world has been for sometime fixed on benzine and nitro-benzine, and on the numerous applications which aniline has received in the printing of fabrics, and in the dyeing of silk, woolen, and cotton.

The violet tints have generally been made with archil, but in consequence of the small stability of that coloring principle, violets thus made change under the influence of light alone, and they are altered by the feeblest acids. Aniline is now replacing archil; it constitutes the base of a fast violet color, which does not fade in the light, and which is acted upon by neither acids nor alkalies. It is to this great stability that it owes all its importance. It gives every variety of shade from the most delicate lilac to the deepest violet. The apparition of this fixed violet has produced a veritable revolution in dyeing, but its introduction has been obstructed to the present time, by the difficulty of procuring it. Messrs. F. Laurent and Casthelaz, manufacturers of chemical products, of Paris, have for some time been endeavoring to overcome these difficulties, and having succeeded in making important improvements in the mode of manufacture, they have erected apparatus at their works at Aubervilliers for the production of benzine, nitro-benzine, and aniline on a large scale, and will be able henceforth to furnish a supply of these articles. We have the pleasure of publishing the following account, which Messrs. Laurent & Casthelaz have addressed to us on their method of manufacture.

Charcoal has not yet been transformed into diamond, but we have succeeded in extracting from mineral coal a product equal in value to that of gold, of a magnificent tint, and of an extraordinary power of coloration; it is called aniline violet. This substance is designated, by persons who do not keep themselves informed in regard to the progress of science, as the violet of coal or of charcoal. Coal is indeed the primary source of it, but it is only after a long series of operations that this precious color is reached.

1. *Distillation of Coal.*—Coal must be submitted to distillation; this operation is the base of the manufacture of illuminating gas, and the products to which it gives birth are: First, Coke, a fixed product, which remains in the retort. Second, Coal tar, a semi-liquid product, which passes over in distillation. Third, Ammonical waters, and the sal-ammoniacs. Fourth, Illuminating gas. Gas and coke are the principal, ammonia and coal tar the secondary products; during a long time, indeed, coal tar was of scarcely any use, and was burned under the retorts; now it is gathered with care and distilled, and it is this product which particularly interests us in relation to aniline.

2. *Distillation of Coal Tar.*—The presence of aniline has been discovered in coal-tar, but in so small quantities and mingled with so many foreign substances, ammonia, benzine, taluine, phenic-acid, bucoline, naphthaline, brai, &c., that to directly extract it a treatment would be required too long and too expensive. The coal tar is therefore submitted to distillation, and furnishes the following products: First, Dry brai, a product not fixed, which remains in the retort. Second, The volatile oils of coal. We shall occupy ourselves only with these latter.

3. *The Distillation of Coal Oils.*—The volatile oils of coal are very complex products; they contain, in fact, nearly all the products which we have mentioned as constituent parts of coal tar, with the exception of the brai. Submitted to distillation they pass over at divers temperatures, and are thus separated, giving us oils of various densities and properties. First, Heavy oils. Second, Light oils. The heavy coal oils are but little employed. In consequence of the property which they possess of preserving wood from the attacks of insects, they are used for injecting railroad ties. The light coal oils are mixtures in variable proportions of benzine, toluine, phenic acid, and other substances of less interest. According to their density they serve for the manufacture of phenic acid, of picric acid or of benzine.

4. *Distillation of Light Coal Oils.*—This operation is the base of the preparation of benzine. It is necessary to submit the oils employed to either two or three distillations, according to their purity; bringing them to a density of 27° or 28° Beaumé. The benzines vary much according to the nature of the coals from which they are made, and according to the temperatures at which they are distilled. These differences are seen both in their odor and volatility, and according to their quality they are applied to various purposes. First, Benzine serves for the dissolving of caoutchouc and gutta-percha. Second, It enters into the composition of certain varnishes in consequence of its dissolving action on resinous gums. Third, It dissolves fatty substances. and therefore serves for removing grease-spots from cloths. Fourth, It is employed for lighting, in which case it is burned in lamps specially adapted to it, either pure, or mixed with other liquids less carbonized. Fifth, It is employed as an agent for carbonizing illuminating gas. By passing gas through benzine it takes up the particles of carbon, and thus acquires a much more considerable illuminating power. Sixth, It is used in the preparation of nitro-benzine. We have cited only the principal uses of benzine, but these will suffice to show the importance of this product.

5. *Transformation of Benzine into Nitro-Benzine.*—Benzine submitted to the action of concentrated nitric acid, or to a mixture of nitric and sulphuric acids, and distilled, gives a reddish liquid which is the crude nitro-benzine. Submitting this product to one or two distillations, we obtain a pale yellow liquid, of an agreeable odor, resembling that of bitter almonds, of a density much superior to that of water, marking 20° to 22° of the hydrometer. This is distilled nitro-benzine.

6. *Transformation of Nitro-Benzine into Aniline.*—Nitro-benzine, pure and distilled, being submitted to the action of nascent hydrogen, transforms itself into aniline, which in its turn may be purified by one or two distillations. It presents itself, then, under the form of an oleaginous liquid, white when first obtained, but soon becoming yellow, rose tinted, and then red. It constitutes a volatile salifiable base.

7. *Transformation of Aniline into Aniline Violet.*—Finally, the white aniline, under the influence of oxydizing agents, is transformed into aniline violet. This substance is sold in several states, as a liquid more or less concentrated, as a paste and as a powder. The following are the comparative prices of the products of which we have spoken:—Coal, ½c. per lb.; coal tar, ¾c. do.; heavy coal oil, 2½c. a 3¾c. do.; light coal oil, 6¾c. a 10½c.; benzine, 10½c. a 13c.; crude nitro-benzine, 57c. a 61c.; rectified nitro-benzine, 82c. a 96c.; ordinary aniline, $3.27 a $4.90; liquid aniline violet, 28c. a 41c.; carmine aniline violet, 32c. a $1.92; pure aniline violet in powder, $245 a $326.88.

The price of aniline is certainly high, but a small quantity suffices to give much coloration; the value of the violet anilines is always proportioned to the quantity of coloring matter which they contain. The importance of this dye is now generally recognized; this importance is due to the fixity, the unalterability, and the beauty of all the violet tints which it produces.

A PERSONAL EXPLANATION.—We are almost daily in receipt of letters from parties in the South and West, inquiring about the responsibility of J. C. Cary, of No. 81 Nassau-street, this city, who has sent out a circular about a patent cap and breast lantern. In this circular, Mr. Cary, it seems, has taken the unwarrantable liberty of referring parties to us as to his responsibility. This he had no right to do; and we take this method of stating that we know nothing whatever about him in this respect.

THE EMPTY PLACE.

A scientific lecture was recently delivered at Canandaigua, N. Y., by the Hon. Henry W. Taylor, of that place, in which he gave a new and quite a scientific interpretation to Job xxvi. 17: "He stretcheth out the north over the empty place, and hangeth the earth upon nothing." He said that the "empty place" had awakened considerable curiosity in the public mind, and after speaking generally of the progress of science and the wonders of nature, gave a detailed account of discoveries in the polar regions—mentioning the open polar sea and the fact that the temperature increases as we advance north from a certain parallel of latitude, and that trees and bodies of animals—natives of temperate, and even torrid regions—float from the North on to the desolate shores of the Arctic ocean. He then read the above passage from the Bible, and remarked that his theory of the "empty place," of which Job speaks, is that it is the great basin or open Polar Sea at the north pole which, as he thought, is about 2,000 miles in diameter and surrounded on all sides by lofty mountains of ice, that would reflect the rays of the sun and raise the temperature of the place to well nigh, if not quite, that within the tropics. The land, if any there be in that ice-bound retreat, might be covered with life—vegetable and animal—and in the long half year of night who knows but that the Lord, in his never-failing providence, has created the aurora borealis to supply to those isolated regions as cheerful light and heat as that of the noonday sun?

AGRICULTURAL FAIR AT BATON ROUGE.

On the second Monday in March next an agricultural fair is to be held at Baton Rouge, in Louisiana. The president of the managing association, J. A. Dougherty, Esq., in forwarding us a prospectus, makes the following remarks which will doubtless be interesting to large numbers of our readers:—

MESSRS. EDITORS:—We are much in need of labor-saving implements in our farming, and we have found that we do need them. A paragraph or two in the SCIENTIFIC AMERICAN might strike the right man in the right place, and make his fortune and help us exceedingly. This is the country for the steam plow, the ditching machine, the horse hoe, the horse corn-planter, and many other implements as yet not invented. Many of us have read of such implements, but having no opportunity to see them in operation we fail to realize their importance; and men of enterprise could not do better than afford us such an opportunity, as, when once introduced, they would speedily go into general use. No better opportunity can occur than will be offered at the approaching fair, which takes place while our legislature will be in session. Good premiums will be offered, and you may assure all who will visit us that they will receive a cordial welcome and the probability of satisfactory sales. Baton Rouge is on the Mississippi river, 130 miles above New Orleans, and the first high land above the mouth of the river, high and healthy. J. A. D.

The Corresponding Secretary is John H. New, Esq., and communications should be addressed to him at Baton Rouge, La.

ECONOMY OF FUEL IN ENGINES.

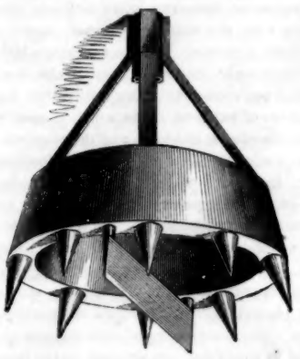
MESSRS. EDITORS:—Last April, I gave you an account of fuel consumed at my dye-wood and grain mill for the year ending Dec. 31, 1858. For 1859 I have a much better account to give:—From Jan. 1st to May 31st, engine run 128 days; coal bills, $725.48 or $5.66 per day; work done, 50 horse power. On June 1st, I introduced a J. & J. Aldridge's "hot-air blast;" have run 172 days; coal bills, $735.70 or $4.27 per day, doing the same amount of work with much less fuel, and about one-third less work for the engineer. The steam can be kept at any point with Aldridge's arrangement, and the capacity of the boiler greatly increased; besides an inferior quality of coal can be used. The first mention of this hot-air blast I saw was in the columns of the SCIENTIFIC AMERICAN, during the month of November, 1857; since then I find a large number in operation. The wonder is that every person using steam does not supply himself with the "Corliss" engine and "Aldridge" hot-air blast.

W. B. R.

Providence, R. I., Jan. 10, 1860.

ARTESIAN WELL-BORING IN QUICKSANDS AND ROCKS.

MESSRS. EDITORS:—I send you two items for publication on the subject of artesian well-boring (descriptions of inventions of mine), which, I think, are valuable, and worthy a place in the SCIENTIFIC AMERICAN. The one is how to bore any size of hole for a well through solid rock, and the other relates to the sinking of a well through great beds of sand. Your readers in the different parts of the country can appreciate my communication, as they know the difficulties attending the drilling through hard rock when the bore is larger than three or four inches; and also the almost impossibilty of sinking the necessary tube in extensive beds of quicksands. These are difficulties that have never been overcome; and hence the sterility of many countries otherwise blessed, but destitute of water. In such places, an artesian well is the only method by which it can be got; and the professional borer will do well to digest the methods here pointed out to him. With these preliminaries, I will proceed to describe, first, the instrument for the rock a drawing of which (in perspective) I here present



for the better illustration of my subject. It is what the profession would call a "built tool;" that is, one constructed of different pieces. In its simplest form, it is merely an iron cup, with pieces of tempered steel, as teeth, fixed in it by means of fusible metal, the points projecting and spreading a little wider than the edge of the cup. But for larger borings, which is the subject of my communication, the cup has no bottom, but the sides are very thick, allowing a hollow ring or groove being scooped out to nearly the depth of the cup, and in this groove the teeth are placed; the points of the teeth projecting a couple of inches or so, and extending a little over the edge. This bottomless cup allows a perfect free passage for the water, &c., to pass and repass through; while, in the act of working, a single chisel crosses the center of the cup, as seen in my figure. The metal embraces firmly all these pieces in the groove, and two or three of these tools, and a few sets of teeth, may be conveyed to any distance where a well is required, and the boring accomplished independent of the services of any blacksmith; for when the teeth become blunted, or worn so as to reduce the size of the bore-hole, they may be taken out of the cup in a couple of minutes by simply melting the fusible metal that binds them together, and re-set with an iron ring under them as a lifter. When cool, the tool will be as perfect as at first; and this may be repeated till the teeth be worn down. This fusible metal holds the teeth as firm as if they were run in with melted lead; and a small stove, oven or boiling water is sufficient to fuse it.

The original temper of the teeth is never impaired by this operation of re-setting, the heat required to melt the metal being so moderate as not in the least to affect their nature. Its composition is 8 ounces bismuth, 5 ounces lead, and 3 ounces tin; melt the lead first, and then add the other metals. The teeth may be either round or square, but all must be of equal length, and, of course, pointed or tapered according to the nature of the rock to be bored; and the bore-hole will always be circular and never angular.

My other item, regarding the sinking of artesian wells through great depths of sand where tubing is absolutely necessary at all times, is to have it smooth both outside and inside, and a sufficient length secured before commencing operations. A small pump must be provided (such a one as Gwinne's centrifugal pump) which operates no valve, and lifts water and sand combined without choking. The pipe of this pump, for my purpose, must be flexible, such as india-rubber, gutta-percha or leather, and pretty stiff, to withstand a collapse; let it be of a length equal to the well tube, but in short sections. Water will be required, but a limited quantity may be sufficient. Let each piece of tubing be fitted together and numbered before commencing; likewise measure and mark the pipe of the pump so as to correspond with the figures on the tube. Dig a few feet under the surface of the ground where the well is to be, and erect a scaffold above. To insure the tube fitting close upon the rock when it reaches the bottom, fix a small piece of rubber tubing to the lower end outside, and let it project about an inch; this will exclude all sand from ever getting into the tube when the well is finished—a precaution rendered necessary on account of the unknown dip or declivity of the rock. All things being ready, screw two lengths of tubing together, and commence by inserting the end in the ground, having guides to insure a perfect perpendicular. All that is necessary, for the accomplishment of the undertaking is to remove the sand from the end of the tube, and it will sink of itself by its own weight; and for this purpose the pump is provided. The end of the pump pipe may now be put into the well tube; and to insure its sinking at all times, there should be three or four feet of lead pipe attached to the extreme end. Water is now introduced into the tube from a reservoir fixed up for the purpose, and the pumping commences, sand and water are extracted and the tube sinks; this, then, is the whole operation. Keep the tube full of water and the pump agoing, and if the water be scarce, that which is drawn from the tube may be carried back to the reservoir and saved. While the pump is going, see that water is supplied to the tube, and as a caution, never stop the pump as long as any sand is flowing, for the sand will settle in the pipe and cause much trouble to clear it out. If a recess is to be taken, or when the tube is down far enough, then raise the pipe in the tube so as to draw nothing but water. We have now got a fair beginning, two lengths of tubing are down, which marks one stage of progress; the pump and feed water being stopped and the pipe lifted out of the tube, two other lengths of tubing are to be screwed on, the pump pipe let into the well tube again as in the former instance, keeping their lengths as nearly equal as possible, that is, to have their lower ends about the same level; now introduce the water as formerly into the tube and resume the pump, the tube will sink as the sand and water is withdrawn, and thus the work will progress quite rapidly if properly managed. Care must be exercised that the tube does not go down out of reach by letting the pipe remain too long in the tube, before raising. It will be understood that a tube furnished with an india-rubber point is to be used only when it is intended to drill the underlying rock; a simple tube being sufficient at other times.

It will be unnecessary for me to enlarge upon the benefit of artesian wells, whether the object sought be water or minerals, it is sufficient that I have done my duty in this communication, which I hope will be appreciated.

J. T.

Wayne Center, Ill., Jan. 21, 1860.

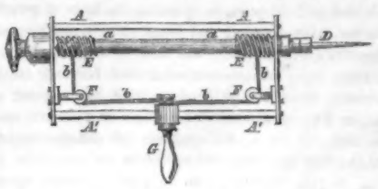
MOUNTAINS OF THE SEA.—There can be no doubt that a portion of California at some period, was an immense inland sea, the water of which sought an outlet either through the Pajaro, at Monterey Bay, to the Pacific or through the Tejon Pass to the southern portion of the State. The more general belief is that the Golden Gate was the outlet, and that it was forced through the Coast Range at a comparatively recent period. Traditions are extant among the Indians, that their ancestors walked across from one side of the famous Golden Gate to the other, while there was a tunnel communication between the waters of the Pacific and San Francisco Bay. In the Tulare Valley and at the Tejon Pass there are indications that a powerful current has at some period passed over the ground. The most learned geologists of the East are quite at a loss when required to give an opinion in regard to our State geology.—*Stockton Republican.*

IT has been ascertained that a work like the Great Pyramid could not be constructed at the present day, with all the aids of modern science, for less than a hundred and thirty-five millions of dollars.

PRESS' QUICK ACTION DRILL STOCK.

The last-received number of the *Mechanics' Magazine* contains an illustration and description of a novel drill stock recently patented in England, and thinking it may interest many of our readers, we republish the same. This improved drill stock will drill holes in metals and other substances with greater ease and rapidity than is attainable by the use of any description of drill stock hitherto made; so, at least, says the inventor, Mr. Press.

In the drawing, A A, A′ A′, is the frame of the drill



stock; *a a*, is the spindle carrying the drill, D. Each end of the spindle, *a a*, has a spiral external thread, as shown at, E E. On the frame are fixed two small pulleys, F, a handle, G, is attached to that part of the frame marked, A′ A′, so that it may slide from end to end upon it. To the inner side of the handle is fastened a gut or string marked, *b*, which passes over the pulleys, and from thence around the spiral threads, where its ends are fastened. By working the handle, G, from end to end on that part of the frame marked, A′ A′, a very quick motion is imparted to the spindle and drill by means of the gut or string passing over the pulleys and in the grooves or spiral guides, which may be large or small in diameter according to the kind of work for which they may be required.

ADULTERATED LIQUORS.—Dr. Hiram Cox, the Cincinnati inspector, has published many deeply interesting facts of his experience in testing liquors sold in that city. In 700 inspections of stores and lots of liquors of every variety, he found that 90 per cent were impregnated with the most pernicious and poisonous ingredients. Nineteen young men, all sons of respectable citizens, were killed outright by only three months' drinking of these poisoned liquors. Many older men, who were only moderate drinkers, died within the same period of delirium tremens, brought on in one quarter the time usual, even with confirmed drunkards, by drinking this same poison. Of 400 insane patients, he found that two-thirds had lost their reason from that cause. Many of them were boys under age. One boy of 17 was made insane by the poison from being drunk only once. Seeing two men drinking in a grog shop, and that the whisky was so strong that it actually caused tears to flow from the eyes of one of them, the doctor obtained some of it and applied his tests. He found it to contain only 17 per cent of alcohol, when it should have contained 40, and that the difference was supplied by sulphuric acid, red pepper, caustic, potassa and strychnine. A pint of this liquor contained enough poison to kill the strongest man. The man who had manufactured it had grown wealthy by producing it.

MOVING PIANOS IN WINTER.—A piano if transported in very cold weather is liable to acquire so low a temperature that on being introduced into a warm room it condenses moisture from the atmosphere; and to the astonishment of the owner, the case, strings and other parts suddenly become bathed with perspiration. The instrument is thus exposed to injury. The difficulty may be avoided by throwing open the windows of the apartment in which the piano is received, so that the temperature of the air and of the instrument will be equal. After thus remaining for a short time the room may be very gradually warmed, and no condensation will take place.

PHOTOGRAPHS OF THE PEMBERTON MILL.—We are indebted to John A. Whipple the skillful photographist of Boston, for a fine photograph of the above mill at Lawrence, Mass. It was taken in a rain storm, the day after the disaster. Any one who may desire to see the picture can do so by calling at our office.

ON another page of our present issue will be found an important statistical article on the subject of railroads, which has just appeared in the columns of our cotemporary, the *American Railroad Journal.*

MACHINERY FOR CHANGING MOTION.

In operating machinery, different motions are oftentimes required for separate parts, according to the work which is to be performed. The best devices for converting one motion into another to produce superior results have engaged the attention of most inventors and mechanics. On the 13th of last September, a patent was issued through our agency to Messrs. Broughton & Lindsay, of Malone, N. Y., for a device to convert rotary into reciprocating rectilineal motion, which is very simple and well adapted to operating the beds of printing-presses, planers (wood and iron), shingle and clapboard machines, sawmill beds, and those of other machines requiring an alternate backward and forward motion. Messrs. Broughton & Lindsay have been in our city during the present week, exhibiting a neat working model of their invention; and we take this occasion to make more public its nature and operation.

If we take the bed of a printing-press, planer, or other machine which requires to be moved back and forth alternately, and place a long rack on each side inside of the frame, and if we take a pinion or wheel rotating on an adjusting spindle, at one end, or at the middle, and make it gear into one rack at one side, it will move the frame or bed of the machine straightforward until the end of the rack is reached by the pinion. If, at this point, a dog on the rack takes into the pinion and throws it over to gear with the rack on the opposite side of the bed, the rotating pinion will at once cause the rack to move backwards, and so on, constantly and automatically, by these devices. This is the method of operation embraced in the devices referred to; but there are some other peculiar and excellent features connected with it.

The beds of machinery which are moved back and forth are generally heavy, and acquire considerable momentum when moving in any one direction, and without some counteracting agent this would cause a severe jar every time the motion was changed—the bed reversed. Such a counteracting agent is embraced in this apparatus. The spindle of the rotary pinion or wheel which gears into the racks, does not move back and forth, but is self-adjustable to bend obliquely from side to side, and to allow its journal at the top a slight side motion. Its journal box has two holes or bearings, with a slit capable of opening between them. Two long flat steel springs are stretched across the frame, and these hold the double journal box between them. When the bed or frame of the machine is moved to one end, a dog or shipper on the rack acts upon the pinion, and pushes its journal through the slit in the box, and thus it acts as a wedge to distend the springs, which absorb the momentum of the frame. And then when the journal springs into its second box, and its pinion is moved over and takes into the rack on the other side of the bed, the springs retract on the journal box, and the frame or bed at once commences to move backward, without a jar and without stopping to overcome the inertia, simply because of the action of the springs. The arrangement and devices to effect these objects are very simple and effective, and, by using a pinion and a wheel on the spindle, a slow forward movement and a quick backward movement may be given to the bed when deemed necessary. A change of motion can be effected at any part of the frame, according to the place where the shipper dogs are set. The apparatus is self-operating from a belt and pulley actuating the main spindle, from which all the different movements are carried out.

LATENT HEAT AND THE STEAM ENGINE.

A person wholly unacquainted with the steam engine, watching one in operation for a short time, sees the engineer do a very surprising thing, that is to open a stop-cock, and let the water (far hotter than ordinary boiling water) spirt out directly into his hand. In running a steam engine it is absolutely essential to observe frequently the depth of water in the boiler. For this purpose a series of stop-cocks are inserted into the end of the boiler, ranging a little above and below the level at which it is desired to keep the water; and the engineer by opening one of these stop-cocks and seeing whether steam or water escapes, learns whether the water level rises as high as the stop-cock. The water in the boiler being heated far above 212°, the point at which this liquor is converted into vapor under the pressure of the atmosphere alone, it is condensed into the liquid state by the pressure of the steam upon it in the tight and strong boiler, and when it escapes from this pressure into the open air, it bursts at once into steam; so that an ordinary observer would find it difficult to determine whether the gage-cock opened into water or into steam. An experienced engineer detects the difference of the two fluids to the eye, and in the sound they make in rushing out; but to verify his observation he usually adds the evidence of touch by putting his hand into the escaping jet. Now why is it that this water, far hotter than boiling water, does not scald his hand? If he should put his hand into either the steam or water in the boiler, it would take the skin off in half a minute. The reason is that, by expansion, a large portion of the sensible heat which is imparted freely to other bodies is converted into latent heat, which is retained by the vapor so that it does not affect either our senses or the thermometer: thus concealing itself from observation, it is called hidden or latent heat. If water could be confined in a boiler so strong that it could be heated to 1,200° and were permitted to escape into the air, it would immediately burst into steam and its temperature would be reduced to 212°—that is to say, about 1,000° of heat are absorbed and concealed in converting water into steam. The more vapors or gases are expanded, the more latent heat will they absorb, and it is owing to the sudden expansion of the steam from the pressure in the boiler that its sensible temperature is so reduced that it will not burn the engineer's hand as it issues through the gage-cock. Under ordinary circumstances the water in the boiler does not contain sufficient heat to convert it all into steam, and a portion of it consequently remains in the liquid form, in minute drops, imparting a part of its heat to the expanding vapor, and thus being itself cooled below the scalding point. It is by the greater moisture of the escaping jet that the engineer knows positively that his gage-cock opens below the level of the water.

In engines driven by condensed air, it is found that the condensing pump becomes warm, a portion of the latent heat in the rarefied air becoming sensible in the condensed air, and consequently escaping into the surrounding metal. On the other hand the engine in which the air is expanded is cooled by the air absorbing sensible heat and rendering it latent in the process of rarefaction. Efforts have been made to manufacture ice in this way. Match boxes were formerly made of a cylinder and piston in which the match was placed in the cylinder and kindled by suddenly condensing the air; the latent heat in the air, being made sensible, kindled the match.

THE GEOGRAPHY OF CONSUMPTION.—Consumption originates in all latitudes—from the equator, where the mean temperature is 80 degrees, with slight variations, to the higher portion of the temperate zone, where the mean temperature is 40 degrees, with sudden and violent changes. The opinion, long entertained, that it is peculiar to cold and humid climates, is founded on error. Far from this being the case, the tables of mortality warrant the conclusion that consumption is more prevalent in tropical than in temperate countries. Consumption is rare in the Arctic regions, in Siberia, Iceland, the Faroe Islands, the Orkneys, Shetlands, and Hebrides. And in confirmation of the opinion that it decreases with the decrease of temperature, it is shown, from extensive data, that in northern Europe it is most prevalent at the level of the sea, and that it decreases with increase of elevation to a certain point. It is uniformly more fatal in cities than in the country. Dr. Hall, of the *Journal of Health*, says to his consumptive friends:—"You want air, not physic; you want pure air, not medicated air, you want nutrition, such as plenty of meat and bread will give, and they alone; physic has no nutriment; gaspings for air cannot cure you; monkey capers in a gymnasium cannot cure you; and stimulants cannot cure you. If you want to get well, go in for *beef and out-door air*, and do not be deluded into the grave by advertisements and unreliable certifiers."

DRIED FRUIT—HOW TO PRESERVE IT.—Now is the time to preserve dried apples from becoming wormy next summer. The eggs of these worms, it is believed, are deposited in the fruit drying, and their vitality can be destroyed by heat without injuring the fruit, if placed in an oven just long enough to heat as hot as it will bear without scorching or cooking. Take it hot from the oven and pack it in linen bags, and hang it up in a dry place.

PROGRESS OF PHOTOGRAPHY.

At a late meeting of the American Photographic Society, held at their rooms in the Cooper Institute, Mr. William Campbell exhibited a camera shield with a slide at the back, covering two holes. By this arrangement, one aperture could remain open, so as to admit of a photograph being taken, after which new space could be brought to the focus for impression, and so on in a circle; then revolving backwards a second or inner circle of impressions could be made. The invention was deemed a clever completion of a hitherto-imperfect idea of improvement, for cheapness and rapidity.

Mr. S. D. Tillman read a short paper on photo-lithography, and presented twenty-five specimens of the art, as recently improved in this city. Mr. Tillman said it was known and admitted in America that practical results had been obtained in the art of engraving by means of light. The advantages of this art were, first, permanency—the basis of its color being carbon—second, fineness and facility of production. About 400 sheets can be readily obtained per day, and each might include from one to ten plates or designs. It was also cheap. The prominent objections to the ordinary photographic pictures were the want of uniformity in the tints, and their liability to fade. Various expedients had been proposed to remedy the first of these faults, but sufficient time had not elapsed to judge fully of the latest plans. Conditions of exposure might arise, to meet which the known remedies might fail; and therefore the question of the unchangeability of the photographic pictures might, for some time, continue undetermined. The photo-lithographic pictures united the two essentials—exactness and permanency. No manipulation of art could equal or approximate the delicate shadings of the pencil. Whenever extreme minuteness of detail was required in permanent tints, preference should be given to the photo-lithotype. It would show microscopic specimens with great beauty and delicacy, and also surgical operations which could be stamped on the instant, in relief superior to that which could be produced on photographic paper, because the negative being obtained from objects almost transparent, they could not be shown on such paper in tints of sufficiently strong contrast.

A letter was read from Mr. Joseph Dixon, of Jersey City, giving an account of a new method of counterfeiting, recently discovered. It seems that, a few years ago, he made some banks an offer to get up colored bills that would be proof against imitation, but his offers met with only indifferent notice. He now puts a shot into their camp in return, by which their weakness is made somewhat apparent, if his process of counterfeiting was reliable. The secret, he said, lay in first obtaining the engraving freed from the colors, which was done by the use of either the megoscope or magic lantern, throwing a large image of the bill on a large screen of white paper. A tracing was then made of all the engraved parts of the picture which, being on such an enlarged scale, could be drawn so perfect that the reduced picture would have precisely the same appearance as the original. A small negative could then be made, by which copies could be multiplied to any extent, and the protecting colors applied in the same manner as by the original engraver.

COLD FROM DAMP CLOTHES.—If the clothes which cover the body are damp, the moisture which they contain has a tendency to evaporate by the heat communicated to it by the body. The heat absorbed in the evaporation of the moisture contained in the clothes must be, in part, supplied by the body, and will have a tendency to reduce the temperature of the body in an undue degree, and thereby to produce cold. The effect of violent labor or exercise is to cause the body to generate heat much faster than it would do in a state of rest. Hence we see why, when the clothes have been rendered wet by rain or perspiration, the taking of cold may be prevented by keeping the body in a state of exercise or labor till the clothes can be changed or till they dry on the person; for in this case the heat carried off by the moisture in evaporating is amply supplied by the redundant heat generated by labor or exercise.

SEWING MACHINES IN SCHOOLS.—We are informed that the Wheeler & Wilson sewing machine, advertised in another column, is being introduced into schools for girls. This is a practical mode of education—one that deserves attention.

PROGRESS OF RAILROADS IN THE UNITED STATES.

The following is a statement of the number of miles of railroad in operation in each year since 1831:—

STATEMENT OF TOTAL MILEAGE FOR THIRTY YEARS.

1831.....	54	1841.....	3,319	1851.....	8,856
1832.....	131	1842.....	3,877	1852.....	10,878
1833.....	576	1843.....	4,174	1853.....	13,315
1834.....	762	1844.....	4,311	1854.....	15,511
1835.....	918	1845.....	4,552	1855.....	18,153
1836.....	1,102	1846.....	4,870	1856.....	21,440
1837.....	1,421	1847.....	5,336	1857.....	24,290
1838.....	1,843	1848.....	5,682	1858.....	26,210
1839.....	1,920	1849.....	6,350	1859.....	27,857
1840.....	2,197	1850.....	7,475	1860.....	29,401

DECENNIAL INCREASE.

1840.....	2,197		
1850.....	7,475	5,278 or	240.2 per cent.
1860.....	29,401	21,922	293.5 "

The total number of miles in operation on the 1st day of January, 1859, was 27,857. The number of miles opened during the year, consequently has been 1,541.

The number of miles in progress in the United States is estimated at 17,580. The extent of mileage of roads in progress can never be stated with much accuracy, but we see no limit to the construction of these works, till they become the common highways for every portion of the country. In the northeastern and in some of the western States, this result seems pretty nearly accomplished; yet, even in those, the system is constantly expanding. Their construction, under a state of affairs similar to the present, must rapidly continue to go on till an aggregate of 50,000 miles is reached. Even the embarrassments of the country which culminated in 1857, seemed to have exerted only a slight influence in checking their progress, which was never more active than at the present time in several of the States.

The total amount of capital invested in all the roads is $1,118,920,929. The increase during the year has been $157,873,565. Our statement a year ago did not embrace roads in progress. The actual increase may be somewhat over-estimated. Not so with the aggregates, however.

Below is a comparative view of the mileage of railroads in the several States on the 1st of January, 1850, 1855, and 1860:—

	1850. Miles.	1855. Miles.	1860. Miles.
Maine.....	175	409	476
New Hampshire.....	309	585	662
Vermont.....	243	454	561
Massachusetts.....	1,095	1,102	1,391
Rhode Island.....	50	50	101
Connecticut.....	434	571	599
New England States.....	2,306	3,171	3,790
New York.....	1,070	2,623	2,779
New Jersey.....	231	429	557
Pennsylvania.....	981	1,681	2,787
Delaware.....	16	39	127
Maryland.....	324	367	478
Middle Atlantic States...	2,622	5,139	6,728
Virginia.....	303	986	1,756
North Carolina.....	302	349	703
South Carolina.....	241	741	900
Georgia.....	609	975	1,243
Florida.....	54	21	290
South Atlantic States....	1,509	3,072	4,892
Alabama.....	113	304	629
Mississippi.....	60	226	691
Louisiana.....	66	198	294
Texas.....	0	32	285
Gulf States.....	239	760	1,899
Arkansas.....	...	...	39
Missouri.....	...	37	724
Tennessee.....	...	326	977
Kentucky.....	28	231	511
South Interior States.....	28	594	2,251
Ohio.....	299	2,453	3,017
Michigan.....	344	474	797
Indiana.....	86	1,406	2,005
Illinois.....	22	884	2,728
Wisconsin.....	...	200	876
Iowa.....	...	...	395
Minnesota.....	...	...	...
North Interior States.....	751	5,417	9,818
California.....	...	...	23
Oregon.....	...	...	...
Pacific States.....	...	...	23
Total, United States.....	7,475	18,153	29,401

TO CUT ELBOWS OF STOVE PIPES BY RULE AND COMPASS.

At the special request of a subscriber, we re-publish the following article from page 50, Vol. X. (old series) of the SCIENTIFIC AMERICAN.

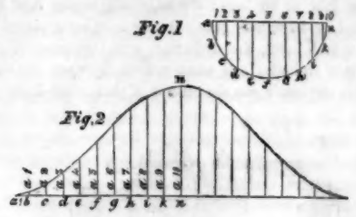


Fig. 1.—Draw a straigh. line, *a n*, and make it equal to the diameter of the stove-pipe, then draw the semicircle, *a f n*, and divide it (the semicircle) into as many equal parts as may be found convenient, *a b c*, &c. From these parts of division draw perpendicular lines upon the diameter, which will divide the figure into ten unequal parts.

Fig. 2.—Calculate the length of the semicircle, Fig. 1, by the proportion of $1 \times 3{\cdot}14159 \div 2 = a\ b\ c\ d$, &c. Draw a straight line for the base, and make it equal in length to this semicircle, and divide it into as many equal parts as the semicircle was divided—10; and then draw the perpendiculars *a*1—*a*5—*a*10, and make them equal to the lengths of the parts of the diameter of Fig. 1, beginning from *a* to 10. That is, the vertical line, *n u*, *a*10, Fig. 2, is the diameter of Fig. 1; the next vertical line, *a*9, Fig. 2, is the length, *a*9, of the diameter, Fig. 1, and thus draw all these vertical lines on Fig. 2, the last one being *a* 1 which is the short division *a*1, Fig. 1. Join the ordinates in these points by short lines, and we have the diagram for a gutter (one half of Fig. 2), double it, and then we have one for a stove-pipe (all Fig. 2), two of which, when joined, form an elbow of 90°. Fig. 2, it will be observed by tinsmiths, resembles the pattern used for elbows. Care should be exercised that the distance between the abscisses do not exceed half an inch; a quarter will be about correct.

HOW TO BURN COAL.

Nine out of ten who attempt to burn coal in a stove, waste about as much coal as is necessary to be be consumed for the obtaining of all the heat desirable. Observe the following rules: We will suppose the stove cleaned out. First, To make a coal fire: Put in a double handfull of shavings, or light kindling-wood instead. Fill the earthen cavity (if the stove has one) nearly full of chunks of dry wood, say four or six inches in length. On the top put a dozen lumps of egg coal. Light with a paper from beneath. In ten minutes add about twenty lumps more of coal. As soon as the wood has burnt out, fill the cavity half to two-thirds full of coal. The fire will be a good one. The coal will, by following these directions, become thoroughly ignited. Second, Never fill a stove more than half or two-thirds full of coal, even in the coldest weather. Third, When the fire is low, never shake the grate or disturb the ashes, but add from ten to fifteen small lumps of coal, and set the draft open. When these are heated through and somewhat ignited, add the amount necessary for a new fire, but do not disturb the ashes yet. Let the draft be open half an hour. Now shake out the ashes. The coal will be thoroughly ignited, and will keep the stove at high heat from six to twelve hours, according to the coldness of the weather. Fourth, For very cold weather. After the fire is made according to the rules first and third, add every hour about fifteen to twenty lumps of egg coal. You will find that the ashes made each hour will be about in that ratio.

This advice relates to cylinder stoves of medium size, as the amount of coal to be fed in depends on the space in the fire-box.

HOW TO BURN SAWDUST SATISFACTORILY.

MESSRS. EDITORS:—In burning sawdust or any other comminuted fuel which affords no interstitial draft, the proper method is, at the first firing-up, to supply the fire on the extreme one side of the furnace, the next time on the other, and so on alternately. A rigid adherence to this rule, with a little experience, will enable many mill-owners to use sawdust exclusively, who now have to mix in other fuel. I. H. S.

Washington, D. C., Jan. 23, 1860.

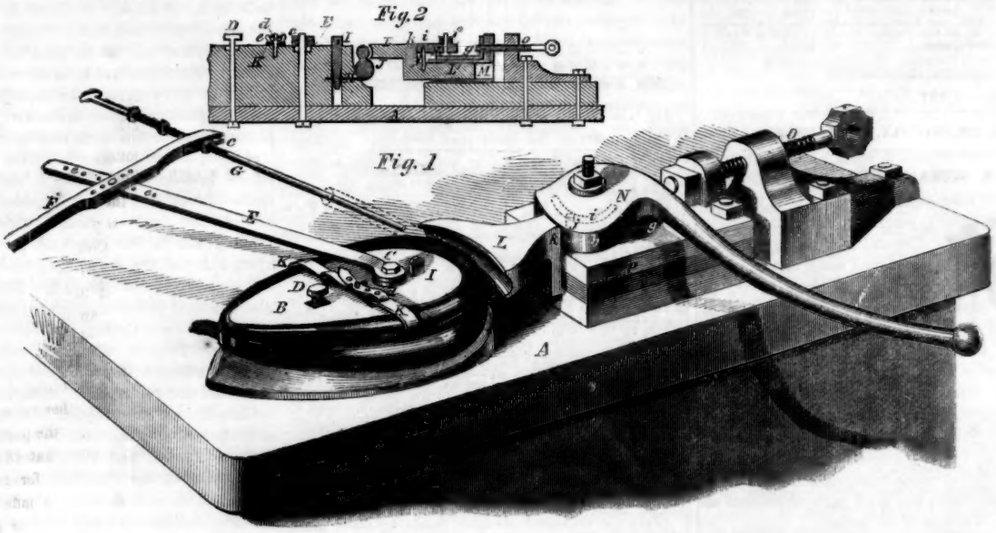
A COLUMN OF VARIETIES.

The railroads in actual operation in the United States, if extended in a continuous line, would reach round the earth, and from the Mississippi to England beside. .....Perhaps the largest plate of glass ever produced was one made at the St. Cobain Works, in France. The length of the plate was 5.37 meters (18 feet), and it was was 3.36 meters (11 feet 9 inches) wide, and 12 milometers, or nearly half an inch thick.....A German clock, over two centuries old, has been set in running order by a watchmaker in Hartford. Although it has not run for more than half a century, it is now keeping good time, and may last another two centuries. It was found by the artist Church, in the possession of a Dutch family in Nova Scotia. In that family it had been handed down from father to son for generations. This is one of the very first clocks ever made with a pendulum. The clock strikes for the half hour and hour, and is wound by means of an endless chain. It is an open frame of black, ancient oak, exposing the works, which are of brass, and very nicely finished.....The first printing office in Providence, R. I., was established in 1762, and the first two things printed were a hand-bill containing news, and a play-bill. The latter was for the first theatrical performance ever given in New England. The company was the first that ever appeared in North America. They were brought over by one David Douglas, a Scotchman, who fitted up a small theater in New York and also appeared in one or two other places, before going to New England.....A line drawn level with the surface of the water in the distributing reservoir between Fortieth and Forty-second streets, cuts the clock tower on the City Hall between the top of the pillars and the clock face.....A great exhibition of the industry of all nations is soon to be opened at Amsterdam, in Holland. It is announced that there will be a complete historical exhibition of apparatus for the manufacture of illuminating gas.....Large discoveries of mineral coal have recently been made in the arrondissement of Alais, in France.....One of the cells of the yeast plant, when at its full growth, measures about 325-100,000th of an inch in diameter.....It is positively ascertained that the moon has neither water nor clouds; at all events, on the side which is turned towards the earth.....The large guns cast at Woolwich are allowed each four days to cool.....A mixture of three parts snow and four of potash produces a cold of 57°, or 89° below the freezing point.....A column of the best cast iron would require to be nearly ten miles in hight before its lower portion would yield by crushing.....Sulphuric acid crystals, on being mixed with water in a platina crucible, evolve such a heat as to heat the crucible almost instantly to redness .....Mr. Fairbairn has calculated that the greatest clear span at which an iron tubular bridge would support its own weight would be between 1,800 feet and 2,000 feet. .....The royalty claimed, under Mr. Griffiths' patent, for his improved screw propeller, is £1 per horse-power of the vessel to which the invention is applied.....With well-fitted piston packing-rings a pressure of between 3 lbs. and 4 lbs. per square inch of their bearing surface is sufficient to keep them tight, whatever may be the pressure of steam worked in the cylinder.....It has been found that in very small capillary tubes—say of the 1-200th of an inch in diameter—water may be cooled as low as 5° before freezing. Under the same circumstances water may be heated considerably above 212° before boiling. .....Mr. Joshua Field found that, in a single instance, a strong laborer, exerting his whole strength, was able to raise 27,562 lbs. one foot high per minute; the duration of the effort being 2·2 minutes. This was in addition to the friction of the apparatus employed, and Mr. Field estimated the whole effect as equal to a horse-power of 33,000 lbs. raised one foot per minute. The average power of an ordinary laborer is only 3,300 lbs. raised one foot per minute.....Sulphurous acid, although extremely volatile, will not evaporate in a platina crucible previously heated red-hot. If, however, a few drops of water are thrown in, the mixture is brought into intimate contact with the sides of the vessel, and such is the energy of the evaporation of the acid, and its absorption of all the heat of the water, that the latter will be not only left behind, but perfectly frozen in the red-hot crucible, from which it may be thrown out as a button of ice.....The declared value of British exportations of iron and steel, in 1857, was £13,406,076. In 1858 the declared value was £11,236,045.

APPARATUS FOR STUFFING HORSE COLLARS.

In making horse collars, the stuffing requires so great muscular strength that many mechanics are unable to work at it continuously. To facilitate this hard labor by means of levers, the apparatus illustrated in the annexed cuts has been devised.

Upon the solid table, A, the collar-block, B, is secured by two pins, one of which, I, acts as a pivot, and the other, D, drops into one of a series of holes in the table, made in a curve concentric with, I, so that the block



HABBERTON'S APPARATUS FOR STUFFING HORSE COLLARS.

may be turned about the pivot, I, and held in place by the pin, D. The collar is fastened to the block by means of the hook, H, Fig. 2, which has a slot near its inner end through which the wedge shaped pin, I, passes and presses it very firmly to its hold on the collar. The bar, E, is connected to the collar-block by the pivot, C, and has the lever, F, hinged upon it by a movable pin pinned to it. The lever, F, also has several holes so that the place of its fulcrum may be varied at pleasure. It is connected at its end by a slot with the stuffing rod, G. The collar being secured to the block, the operator introduces a quantity of hair or other elastic material used in stuffing, and presses it in with the rod, G, by acting upon the longer end of the lever, F.

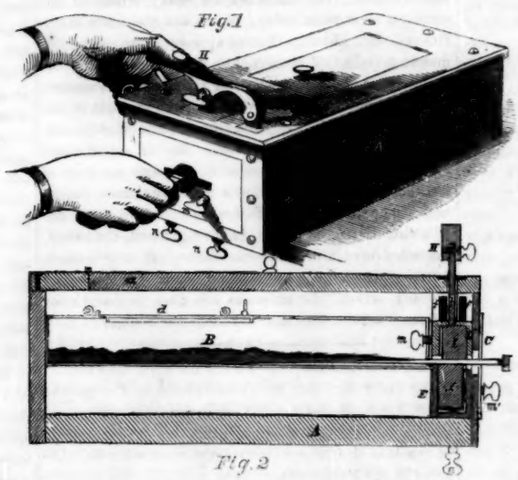
For fashioning the collar in proper form, the concave, L, is formed and secured to the table in a manner to permit it to have a horizontal reciprocating motion. Its inner part, L, slides smoothly in the block, P, and is carried back and forth by means of a pin, *j*, which passes into a curved eccentric slot in the lever, N. The lever and concave are both secured to a plate which slides in a dove-tail groove in the top of the block, P, which plate is adjusted and held in place by the set screw, O. As each portion of the collar is filled, it is pressed into shape by bringing the concave, L, against it with force by means of the lever, N, and as the filling proceeds, the pin, D, is withdrawn, and the collar block is turned upon the pivot, I, to bring the other portions of the throat of the collar successively under the action of the concave, L. To fill the opposite side of the throat of the collar the position of the lever, F, is reversed. In filling the sides of the collar, these are secured to the block by means of the hooks, K, the ends of which are held together by the adjustable strap, *d*, and set screw as shown. All except the throat of the collar is filled by using the stuffing rod in the hand without the aid of the lever.

The patent for this invention was issued, through the Scientific American Patent Agency, Jan. 3, 1860, and persons desiring further information in relation to it, will please address the inventor, William S. Habberton, at Mount Carmel, Ill.

TESTING A BRIDGE.—Before the great Victoria Bridge at Montreal was accepted by the contractors, it was put to the severe test of a loaded train weighing the enormous load of one tun to the square foot. While in the first tube only, the deflection of that tube was $\frac{7}{8}$ths of an inch; the adjoining empty tube being lifted in the middle $\frac{3}{8}$ths. On the load being placed half over both tubes, the deflection was the same in each, $\frac{3}{8}$ths of an inch; and when run wholly upon the second tube, the result was the reverse of that in the first. The final test was the long central span (330 feet), where the deflection was only $1\frac{5}{8}$ inches. In no instance was the deflection greater than $\frac{5}{8}$ths more than what was expected.

IMPROVED KNIFE-CLEANER.

The apparatus from which the drawings were made for the accompanying cuts, presents more the appearance of a parlor ornament than of a kitchen utensil.



M'NAMEE'S KNIFE-CLEANER.

It consists of a neat box, A, made of mahogany or other wood, with the tin box, B, occupying the middle portion. A door, *a*, is made in the box, A, and a door, *b*, in the box, B, for the introduction of fine emery or other suitable scouring powder into the box, B. In the end of the box an opening, *c*, is made sufficient to admit the blade and shoulder of a knife, which opening is surrounded by the metallic plate, C. Within the box opposite the opening are two india-rubber pads, I I, the lower one fastened in a stationary metallic socket, E, and the upper one in a metallic socket, D, which has a vertical motion in which it is guided by the rods, *f f*. The socket, D, is connected with the lever, H, by the rod, *i*, and is pressed down by spiral springs. The india-rubber pads are held in the sockets by the screws, *m* and *m'*, and the lower pad is raised as its upper surface is worn away by means of the screws, *n n*, pressing against the plate, *k*. The knives are cleaned by rubbing them between the pads, I I. In introducing them, the upper pad is raised by placing the hand upon the lever, H, and pressing it upward, and when the knife is between the pads the upper one is pressed down upon it by means of the lever. The knife should be moistened in order that the polishing powder may adhere to it.

The patent for this invention was issued Nov. 8, 1859, and persons desiring further information in relation to it will please address the inventor, J. McNamee, at Easton, Pa.

THE CORT FAMILY AND THE BRITISH GOVERNMENT.—A pension of £150 per annum has been granted by the queen to the daughters of Henry Cort, whose inventions in the manufacture of iron have done so much for the growth and prosperity of England. The SCIENTIFIC AMERICAN has, on more than one occasion, directed attention to the benefits which Henry Cort conferred upon his native country by his inventions, and shown how he had been so deeply wronged by some of the brutal officials of the British government; the paltry pension of £150 per annum to his aged descendants may afford a balm to the consciences of its aristocratic rulers, but it places their justice and generosity in a most unenviable light. It must be understood that this pension is not from the privy purse of the queen, but the pension fund, which is under the control of the sovereign, with the advice of the ministers.

A GOOD NEIGHBOR.—Our neighbor, the New York *Dispatch*—an interesting and valuable journal—in noticing the SCIENTIFIC AMERICAN, says:—"The proprietors of this invaluable publication have sent to this office the first volume of their new series, elegantly and substantially bound. Of the merits of the SCIENTIFIC AMERICAN it is unnecessary to speak. It is too well known to need a word of praise at our hands. It is an honor to American intelligence, invention and skill. Its readers are among the most cultivated minds of the country, who look to it as the exponent of every useful art and science. It is nobly sustained, but we would that its present circulation were doubled, trebled—yea, quadrupled. It cannot have too many friends. Its editors are industrious, talented, enterprising; and their writings, in terseness and vigor, will compare with those of any similar journal in either hemisphere. In fine, we look upon the SCIENTIFIC AMERICAN as one of the best, if not the best, of the hebdomadals of its class published."

Scientific American.

MUNN & COMPANY, Editors and Proprietors.

PUBLISHED WEEKLY

At No. 37 Park-row (Park Building), New York.

O. D. MUNN, S. H. WALES, A. E. BEACH.

TERMS—Two Dollars per annum.—One Dollar in advance, and the remainder in six months.

Single copies of the paper are on sale at the office of publication, and at all the periodical stores in the United States and Canada.

Sampson Low, Son & Co., the American Booksellers, No. 47 Ludgate Hill, London, England, are the British Agents to receive subscriptions for the SCIENTIFIC AMERICAN.

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VOL. II., No. 5.....[NEW SERIES.].....*Fifteenth Year.*

NEW YORK, SATURDAY, JANUARY 28, 1860.

THE WINANS STEAMER.

N our last number a correspondent has given a most favorable account of this novel steamship, but some statements are contained therein which cannot be allowed to pass without a brief review. Its projectors deserve praise for their undertaking, were it for no other purpose than that of endeavoring to find out what new results may be developed by such a unique vessel. To the scientific and engineering community, every experiment, carefully conducted, is valuable as a future guide, whether success or failure attend it; and such will be the result of the Winans steamship.

From the statements of the correspondent referred to, it is evident that when the Messrs. Winans commenced to plan their steamer, they entertained exaggerated ideas of the defects in existing vessels, such as those of the Cunard and Collins lines and our best river boats. It has been intimated that they believed improvement in such forms of ships to have nearly reached perfection, with very little done towards their safety, economy and regularity. With all that had been accomplished before them, it is said that "steamers still went down at sea, were destroyed by fire, or were cast upon the shore; and the length of their passages were still dependent, though in a much less degree, upon the same contingencies of the seasons that had impeded sailing vessels." Commencing operations with such ideas, Messrs. Winans have constructed their steamer wholly of iron, to avoid the danger of fire at sea. While this is to be commended as a sound proceeding, their fears of the number of steamers lost by fire have been over-colored, because, so far as we can recollect, only one ocean steamship (and her hull was iron) has been destroyed by fire in twenty years. Nearly all the losses on the Atlantic have been caused by collisions and running on rocks during foggy weather, and against such contingencies the new steamer is not more safe than any other. Against the most frequent cause of shipwreck at sea, nothing has been gained by its construction, and it has not therefore ensured greater safety.

It is creditably related that not a single life has been lost on board of the Cunard steamers in twenty years; and their passages across the ocean have been made with great regularity. We hope the Winans steamer may surpass all others in these respects, but hitherto its history has afforded no solid basis for confidence in its safety, speed or economy. When its first trial trip was made, in January, 1859, the model was found defective; it was too blunt at the extremities, it caused a great swell at the bow and a furrow at the stern, and, as a consequence, its speed was very low. New and longer ends, of a different curvature, were then applied, and an increased speed was secured. After this it was again lengthened, and the swell and furrow disappeared. It is now asserted that improvement in this direction has been reached, and yet Messrs. Winans are still going to increase its length by 200 feet, to be added amidships. From the changes already made, and those designed to be carried out, what other conclusion can be drawn than that dissatisfaction has thus far been the result?

These changes in the dimensions and form of this vessel afford evidence that the unfavorable predictions of the scientific press have been verified, and that those who have said *they were unfounded* have overlooked the facts of the case. It is remarkable that, with all the changes which have been made in this steamer to avoid great swell in front and furrow behind, it has just attained to that perfection which was reached many years ago by our best river steamboats.

It has been said that this vessel is so constructed that its speed is not affected by waves and storms at sea. This statement we cannot credit; such a result is a mechanical impossibility. Every vessel, no matter what its form may be, is just as much affected in its speed with waves as a locomotive would be in running over a rough cobblestone pavement. When the Winans steamer is completed, as contemplated, it will be a hollow parabolic spindle, 400 feet long and only 16 feet in diameter; a more defective form and size of vessel for useful purposes could not, in our judgment, well be imagined.

DEATH OF MACAULAY.

The scythe of the relentless reaper, Death, still seems busy in sweeping down the "great ones of the earth." Prescott, Brunel, Stephenson, De Quincy and Irving have lately been called away, and now Thomas Babbington Macaulay—the poet, orator, statesman, essayist and historian—tarryeth no longer among the living. His death, it is related, took place suddenly, from disease of the heart, in London, on Wednesday, December 27, 1859, at the age of 59 years. This sad event has caused general and profound regret, for it had been hoped that his life would have been prolonged to complete his remarkable history of England down to the present day. Irving was kindly permitted to finish the work he had contemplated to execute; but Macaulay was cut down in the very midst of the harvest field, and his golden sheaves lie scattered on the ground without a hand to gather them up.

Macaulay was born in England, of wealthy parents, in the year 1800; and he received a thorough university education. The profession which he selected was that of law, but he very early distinguished himself as one of the contributors of the *Edinburgh Review*, by an essay on the life and writings of Milton, which, for originality of thought and felicity of expression, has perhaps no peer in any language. By his varied genius, industry and learning he soon became a great man, both as a writer, a speaker in the British Parliament, and a member of the Ministry. He was always a steady friend of the people, a lover of rational freedom and his fellow-men. But it is as a historian that he appears in the most commanding light. We think him unequaled in this department, for power in wielding the English language. Combined with a brilliancy, grace, and strength of expression, he is still wonderfully minute and condensed in meaning. He possessed the true idea of a historian's office. Others had written as if the petty intrigues of courtiers, the whims of princes and potentates, battles and sieges, were all that was worthy of record in the life of a nation; but he has made the condition, the habits, the every-day life of the people, *history*. He now "sleeps the sleep which knows no waking," but "though dead he yet speaketh," for his works live after him, and their influence will be felt while our language is spoken.

PHOTOGRAPHY AT THE PATENT OFFICE.

We understand that the Commissioner of Patents has made arrangements for the employment of the photographic process as a means of producing the thousands of copies of drawings so constantly required to be executed at the Patent Office.

The inventive public and all who have any interest or connection with matters relating to patents will hail the introduction of this improvement with great pleasure. Its immediate tendency will be to cheapen the cost and improve the character of the drawings, and greatly diminish the time required to obtain them. Two or three weeks are often required, at present, before orders for copies can be filled, and the charge, as compared with what the same work can be had for, outside the Patent Office, is exorbitant. For drawings which can be done elsewhere for a hundred dollars a charge of *three hundred dollars* is made at the Patent Office. The introduction of the photographic process, if confided to the care of experienced and prompt artists, ought to enable the Commissioner to furnish copies of drawings, or views of models, almost on the same day that the order is given; and ought also to enable him to reduce the charges, as compared with the present rates, at least from fifty to seventy-five per cent.

Another benefit which will attend the employment of of photography will be found in the improved character of the cuts which illustrate the annual reports of the Patent Office. We understand it is the Commissioner's intention to have the drawings for the reports photographed directly upon the blocks, ready for the engraver. This is a capital idea. The saving in time and expense is obvious, while the reports will be rendered much more valuable, because the engravings will be the *fac-similes* of the originals, on a reduced scale; and, with care in the cutting, they will represent the invention much more clearly than heretofore. At present the drawings are all reduced by hand; but the small space into which they must necessarily be compressed renders clearness and exactitude, in many cases, impossible.

Commissioner Bishop also proposes, we understand, to supply each of the Examiners' rooms in the Patent Office with photographic copies of all the patent drawings that pertain to their respective classes. This will be a most admirable improvement. It is hardly to be believed that, at the present time, the whole business of the Patent Office is transacted upon a single set of drawings and records. Yet such is the fact, and the delay and inconvenience thereby occasioned have become a serious drawback to the efficiency of the department. The officials are compelled to pass away a large portion of their valuable time in running hither and thither among themselves, searching for drawings or records, or waiting for them while in use by others. We believe that at least one-third the available time and business capacity of the Patent Office is at present wasted by this miserable "one-horse" system. Its removal as proposed would, unless we are mis-informed, be equivalent to an increase of thirty-three per cent in the working force of the department. We wonder that it has been allowed to continue so long; and we are not surprised that an efficient, enterprising officer like Commissioner Bishop should have observed the defect and sought the remedy so soon after his entrance upon his official duties. We trust that he will make a thorough and a speedy reform in the matter.

THE LAWRENCE CALAMITY

The awful disaster which occurred at Lawrence on the evening of the 11th inst., and which was described in our last issue, has called forth from our cotemporaries a series of frantic articles which illustrate, in a very striking manner, the abnormal action of the human mind under the influence of an unexpected, strange calamity. In reading these articles, one would suppose that the usual fate of American buildings was to fall down, that the great majority of our merchants were crushed beneath the ruins of their own stores, and that the sleep of our citizens was perpetually disturbed by the crash of their neighbors' buildings, as they came tumbling to the ground! Now the fall of the Pemberton Mill was one of the most appalling disasters that ever resulted from human carelessness. But is it not an exceptional case? Of all the thousands of manufactories which have been erected in different parts of the country, has any other one ever fallen? The horror which it excites is mainly owing to the fact that it is exceptional, and the result of carelessness. Many and many a time have men deliberately planned events, and brought them to pass on the battle-field, far surpassing this in every form of suffering, and the account has been read with a general feeling of exultation.

Another noticeable thing in connection with this dreadful affair is the extensive call for legislative interference with the construction of buildings. Mankind have not yet learned (after the lessons of all the ages, and even in this free country) that laws are not omnipotent. We have long ago observed that legal restraints upon the free actions of men are very certain to produce many evils which were not anticipated, and almost certain not to accomplish the object aimed at. Supposing our legislatures mature their bills, appoint their horde of inspectors to prey upon the community and interfere with the development of our material progress, will they prevent buildings from falling down? We have been told by an English gentleman, who knew the owner well, that, when the buildings fell in Tottenham Court road, London, a few years since, the government inspector had just left the premises. Neither the paternal governments of Russia, France or Italy have been able to save their

people from similar disasters; nor could the admirable police of London prevent the awful crush which occurred at the Surrey Music Hall, a short time ago. In this very case, the owners of the Pemberton Mill are reduced from affluence to poverty; and all experience has shown that the dread of social degredation is as powerful a motive as can act upon human nature. If the danger of losing $300,000 would not stimulate them to make their foundations secure, we do not believe that any inspector would accomplish the job. Experience in building, as well as in other things, has shown that self-interest, where it is brought to bear, is more safely to be trusted than the action of an uninterested and indifferent official.

In large cities, it may be well to have some restrictions in regard to buildings, and it no doubt is; as the close neighborhood of property subjects one owner to damage from the acts of another. But if our State legislatures pass a series of statutes restricting building operations throughout the country, we venture the opinion that such statutes will prove vexatious and annoying, and will do very little, if anything, towards preventing buildings from falling down.

A SUCCESSFUL INVENTOR-A GOOD TRADE.

MESSRS. EDITORS:—I have the pleasure to inform you, that I received my patent papers from Washington on Dec. 31st; and I ought to have informed you before this, with a grateful acknowledgment for the skillful manner in which they have been got-up by you. I have also the pleasure to acquaint you that I have sold one half of my interest for $10,000. This is my fifth application to the Patent Office. On my first I prepared the papers myself and got a patent; the second and third I lost by employing bungling agents; the two last I obtained through your house; and I am in hopes you will hear from me shortly in the same way, believing it to be the *cheapest, surest* and *most expeditious* mode of obtaining my rights. R. S. S.

Athens, Ga., Jan. 7, 1860.

[We are much pleased to hear of the success of our friend, and hope he will still find the field of invention encouraging and profitable. A gentleman called at our office one day last week, and had an assignment made out, granting to the purchaser (a farmer) a right on a seed-planter, for the state of New Jersey, for which $500 was paid. The next day the farmer called again, and instructed us to prepare an assignment from him to another person, for the same right; the second purchaser paying $1,000. The farmer thought—and so thought we—that he was doing a pretty good business. On the same day in which one of these transactions was made, a couple of patentees sold, for $7,500, the right to use an invention in one particular department of business in which it can be employed, reserving for themselves most of the patent and territorial right.

There is scarcely a single day in the week that we do not prepare one or more transfers of patents for valuable considerations. One day last week we prepared five assignments of patents; indeed we can confidently say that we have never known more sales of patented inventions in the same period of time as have occurred during the three months past. The fact is becoming more and more apparent, every day, that inventors are about the most useful class of our citizens. Legislation, as a general thing, has become, now-a-days, if not absolutely unfriendly, certainly indifferent to the progress of the useful arts; and that progress is thus made to depend upon the wits of the ingenious men of this country, who have done more for the material wealth of the nation than any other class.—EDS.

STRENGTH OF WROUGHT-IRON BEAMS.

A correspondent in this city makes the inquiry, "At what distance apart would it be prudent and *perfectly safe* to place wrought-iron beams of the annexed "I" section—hight 9 inches; top and bottom flanges, each 4 inches wide, and the whole beam throughout one-half inch thick? The spaces between the beams are to be filled with 4-inch brick arches; the spandrels to be filled with concrete—making the distance from the bottom of beam to top of concrete 13 inches—and the whole to be covered with flooring, in the usual manner. The floor is to be 35 feet wide by 80 feet long; but a girder wall extends the whole length of the room, making the distance between the supports of the beams 17 feet. The room is to be filled with soldiers in motion."

When we received this letter, we thought we could easily refer to tables of calculations on the strength of such beams, by J. Thomson, A. M., of this city, which had been furnished us more than a year ago, and the correctness of which had been verified by a series of experiments. We regret that these tables have been mislaid, but we shall give his formula for such calculations.

Wrought-iron beams are generally put into buildings about four feet apart, as in the "Harpers' Building," in Pearl-street, this city, the floors of which are very strong and firm. The top flange of a beam is principally used to prevent twisting; the lower flange is the main object of strength, and should be formed very accurately, with a clear defined edge and a smooth face. As we understand it, the beam referred to is a single span of 17 feet long, between supports. Its strength to sustain a weight placed at the middle may be calculated by the formula $W = a\ c\ 4\ h \div l$; in which a is the area of the flange in inches, c the co-efficient equal to 60,000 lbs.—the breaking weight of an inch of American iron, h the hight or depth of beam and l its length in inches. Thus: $4 \times \frac{1}{2} \times 60{,}000 \times 36 \div 204 = 21{,}127$ lbs., or with the load uniformly distributed, it will be 42,254, which is more than 10 tuns in the one case and 20 in the other. The weight of the beam should also be substracted from this. At 4 feet apart there will be 20 beams for the floor, which will support 845,080 lbs. uniformly distributed; or 226 soldiers, with a space of 3 feet between the ranks and 2 feet between each man, their united weight will be 31,650 lbs., at 140 lbs. each. Marching at the rate of 3 miles per hour, the momentum on the floor will be 145,590 lbs. per second, a load which such beams can very well support did it not beget a dangerous vibratory motion which accumulates the tensile strain. The strength of the beams given, however, is nearly six times greater than the momentum of 226 soldiers marching at the rate of 3 miles per hour on the floor. To this subject we expect to advert in our next number, and present other calculations and formula.

CHANGES IN GUTTA-PERCHA.

MESSRS. EDITORS:—I noticed some time since in your paper some remarks upon the changes taking place in gutta-percha after exposure to the action of salt water. I have frequently noticed such changes in surgical splints made of this material, after a few months use. I have now in my possession portions of a splint which I applied in a case of hip-joint disease, which became so brittle as to break upon a very slight force being applied to it. I will send you pieces of this should you desire it.

R. U. P.

Nahant, Mass., Jan. 16, 1860.

AMERICAN AND ENGLISH LOCOMOTIVES.

The Americans have enough of which to be really proud, and do not need to resort to ignorant and vulgar, if not dishonest, boasting to make out a case. Such a course only reacts upon them, to their own damage, in the end. Russians, Austrians, Egyptians, Chilians, and other foreigners, are becoming sufficiently enlightened to detect and despise such shuffling.—*London Engineer.*

[Without debate, the best answer which can be furnished to the above, is to state the fact that the Chilian Railroad Company has ordered two more locomotives from Rogers & Co., of Paterson, N. J., which are to be similar to the two whose alleged superior performances over the English engines have given so much delightful cause for our London cotemporary to grunt and growl.—EDS.

WE have just received another interesting letter from our regular correspondent, E. M. Richards, which we shall publish in our next.

TO MAKE A POWDER WHICH INFLAMES ON EXPOSURE TO AIR.—To the substance possessing this property is given the name of *Homberg's pyrophorus:* it is prepared in the following manner:—Equal parts of alum and coarse brown sugar are to be mixed together and dried over the fire in an iron ladle, being diligently stirred all the while with an iron rod. The mixture melts, becomes thick, swells up, and runs into small dry lumps. These are coarsely powdered in a mortar, and again roasted till the operator is well assured that the mass contains not the least moisture, when it looks like a blackish powder of charcoal. This must be put, while hot, into a common phial, previously luted on the inside, by being washed with a weak solution of borax, made as thick as cream by the addition of pipe-clay. The phial, when charged, must have a narrow glass tube, six inches long and open at both ends, luted into its neck, and it should be only three-fourths filled. When ready, it is to be placed in a crucible, or deep iron pan, and covered with sand; and the crucible is to be put into a fire and heated to redness; a thick smoke will rise from the tube for a quarter of an hour, and be succeeded by a sulphurous vapor, which must be inflamed. When this flame disappears, the operation is completed; the tube must then be closed by a plug of soft clay, and the crucible must be removed from the fire. As soon as the phial becomes cool enough to be handled, the contents of it must be hastily transferred into a dry and warm stout glass phial, which must be secured by a ground glass stopper. Experiment:—Throw a little of this powder upon a flat dry surface, in a short time it will burst into flame. Rationale:—The sulphuret of potassium derived from the alum attracts moisture, or (perhaps) a little potassium formed in the process attracts oxygen from the air, and generates sufficient heat to kindle the carbonaceous matter mingled with it.

USE OF SNOW IN COOKERY.—A correspondent of the Boston *Cultivator* says:—"Put corn meal into a good-sized wooden or other bowl, with sugar and salt to the taste; then add twice or three times its bulk of snow, and stir it together with a spoon. When well mixed, it appears like so much dry meal or snow. Fry a little on a hot griddle; if it cooks too dry to turn well, add more snow; if two wet to be light, add more meal, when just right, fry on the griddle in convenient-sized cakes, and they will be as light as can be desired. I claim to have first suggested, to the best of my knowledge and belief, the above sure test for arriving at the right proportions, namely, trying a little on a hot griddle, and adding corn meal or snow, as the case may require."

CALIFORNIA MINES.—The *Hydraulic Press* states that great operations in fluming are still being carried on in the golden country. Water is being conducted from great distances in tunnels to places where there is plenty of gold, but which have hitherto been unworkable, on account of the absence of water for washing. In some places the miners had struck against the high tariff charged for water by the proprietors of tunnels; a reduction in the price had been the result, and great activity was expected to prevail this year among all the mining companies.

THERE has recently been presented to the Museum of the Medical College, Mobile, a beautiful specimen of legatta or lace-wood tree. The peculiarity of it is in the fibrous nature of the bark, which is about an eighth of an inch thick. From this bark has been dissected more than 20 coats of apparently real crape or lace, most of them large enough to serve as a small handkerchief. It can be washed and ironed like ordinary muslin. The tree is a native of the West Indies, and is very rare.

CHEMISTRY OF CARBON.—Professor B. Silliman, Jr., of Yale College, delivered a lecture on the above topic, accompanied with experiments, at the Cooper Institute, on the evening of the 19th inst. The whole pleasure of listening to it was destroyed by a host of noisy boys from the public schools, who were admitted free.

A paper has been published by Mr. David Chadwick, of Salford, England, on the rate of wages current in the manufacturing districts during the past twenty years. It is remarkable that, while the hours of labor have been reduced from 69 to 60 weekly, the rate of wages has increased 20 per cent on an average.

WEEKLY SUMMARY OF INVENTIONS

The following inventions are among the most useful improvements patented this week. For the claims to these inventions the reader is referred to the official list on another page:—

BOILERS &C.

Actual experiments with boilers having riveted joints of the usual kind, that is to say with the marginal portions of the plates which contain the rivet-holes, of the same thickness as the rest of the plates, prove that if the strength of the plates is assumed to be 100, the strength of the joints, if secured by a single row of rivets, is about 56, and if secured by a double row, about 70. Now as the strength of a boiler is to be measured by the strength of its weakest part, it is evident that a boiler with such joints, can only bear with safety 56-100, or 70-100 of the pressure it could bear if the joints were of the full strength of the plates, and hence that a large proportion of the metal now used in boilers is useless, and that the same strength might be obtained with plates of very much less thickness, if the riveted portions could be made as strong as every other portion. By the use of so much thinner plates a great saving in the cost of all boilers would be effected, but this advantage is of trifling importance compared with that which would result to steam navigation from the immense saving in the weight of iron. The latter advantage would be very great in ocean navigation, as it would enable more coal or freight to be carried, but would be still greater in the navigation of shallow rivers where boats of the lightest draft are required. The saving of weight will also be of great importance to railroads on account of the saving in wear and tear of the track, and in fact it will have more or less importance in all boilers of locomotive or portable character, as the boilers of steam fire engines, steam plows, and portable steam-engines; and in iron ships, gasometers, and other structures or apparatus formed of iron plates united by riveting, the advantages of thus reducing the thickness of the plates will be almost or quite as great as in steam-boilers. James Buchanan Henry, of this city, has patented an invention the object of which is to make the joints of boilers and other structures or apparatus composed of metal plates united by riveting, as strong as the rest of the plates, and to this end his invention consists in making the marginal portions of the plates which are to form the laps of the joints and receive the rivets of a sufficiently greater thickness than the rest of the plates, to compensate for the weakening effect of the rivet holes.

ELEVATING VESSELS.

This invention has for its object the remedying of the difficulties attending navigation in shoal water over sand bars without the employment of excavators, or what are denominated "camels," which are sometimes used to carry boats over the bars, or for elevating sunken vessels docks, &c., the operation of which are well understood. It consists in furnishing vessels of any description with a strong metallic vessel of a suitable capacity, which will serve to contain condensed air, the air to be forced into this vessel by suitable air pumps operated by the engines or by manual power, before the vessel starts on her voyage or any time during the voyage, so that the condensed air will be ready for use at the appropriate time, with this vessel is connected a strong pipe or receiver, and to this receiver are attached, at the required intervals along its line, branch pipes, of any flexible material found best adapted to this purpose; these communicate with suitable bags, or buoys, and with these bags are connected cords or chains which are attached to the side of the vessel and arranged in such a way that the buoys can be thrown over the stem and stern and be brought under and near the keel while in an uninflated state, and while in this situation can be inflated simultaneously so that the vessel may be elevated horizontally and thus decrease the draft sufficiently to permit it to float over the bar, or whatever may be the obstacle in its course, in perfect safety. This improvement was designed by T. Cato McKeen, of Nashville, Tenn.

OSCILLATING ENGINE.

This invention relates to that class of oscillating engines to and from which the induction and eduction of steam is effected through ports in a side pipe. In this class of engines there is always a greater or less tendency of the steam acting between the side pipe and the receiving face of the cylinder, to force apart the valve faces, and this tendency increases or diminishes in force with the variation of pressure in the boiler and with the more sudden variations produced in the side pipe by the action of the governor, so that such variations in the pressure have heretofore rendered it difficult to accomodate or adjust the means used to resist the effects of such pressure, and hence when the pressure has been very high, the valve faces have been forced apart and permitted a leakage of steam, and when the pressure has been low, there has been too much friction between the said faces, causing a serious loss of power and an undue degree of wear of the said faces. The first part of the invention is designed to overcome this difficulty, and to this end it consists in a certain mode of producing on the end of the trunnion on the opposite side of the cylinder to the side pipe, a pressure varying in proportion to the pressure on the receiving face of the cylinders. Another difficulty to be encountered in this class of oscillating engines results from the unequal expansion and contraction of those parts of the working face of the side pipe, through and in contiguity to which the inducted or live steam passes, and those parts through and in contiguity with which the cooler exhaust steam passes; and the second part of the invention consists in providing for a constant supply of live steam from the induction chamber of the side pipe, to a cavity formed within that part of the face of the said pipe which is contiguous to the eduction chamber, or within the walls of the eduction chamber, for the purpose of producing (as nearly as is practicable) a uniform temperature, and consequently a uniform expansion and contraction of the metal in all parts of the face of the side pipe. The inventor of this device is William S. Mackintosh, of Pittsburgh, Pa.

OSCILLATING ENGINE.

This invention relates to that class of oscillating engines to and from which the induction and eduction of steam is effected by means of a side pipe, and its object is to counteract the tendency of the steam acting between the side pipe and the side of the cylinder on which the steam is received to force apart the valve faces and permit an escape of steam. It consists in so applying a piston or its equivalent in relation to the trunnion on the opposite side of the cylinder to that on which the steam is received and so conveying steam to act upon the said piston or equivalent that it may be thereby forced directly towards the end of the said trunnion, and through interposed bearings of proper character may be made to press against the said trunnion to hold the valve face of the cylinder against the corresponding face of the side pipe. The credit of this contrivance is due to William S. Mackintosh and James Hemphill, of Pittsburgh, Pa.

PRINTING PRESS.

The object of this invention is to apply to an ordinary hand printing press, such as is generally termed a job printing press, an automatic inking device so arranged that the form may be properly inked by simply moving the frisket and forcing down the platen, the usual manipulation of the old hand press. The invention also has for its object the proper supporting of the platen to preserve its horizontality whatever may be the relative position of the form or type with it, and also a more ready adjustment than usual of the blank sheets to the frisket. This device has been patented to Oliver E. Weston, of Roxbury, Mass.

MACHINE FOR PRINTING ADDRESSES ON NEWSPAPERS.

The object of this invention is to obtain a device that may be attached to a printing press of any of the known kinds, and operate conjointly with it in such a way, that the addresses may be printed on the margin of the sheets simultaneously with the printing of the newspaper on the body or central parts of the sheets; thereby dispensing with the labor of putting the addresses on each paper after it is printed. J. A. Campbell, of Georgetown, C. W., is the inventor.

POWER LOOM.

This invention consists in certain improved means of governing the operation of the let-off mechanism and the consequent delivery of the yarn from the beam, by the tension that is produced on the cloth by the take-up, whereby a more uniform tension of the cloth and warp is preserved, and all the advantages known to weavers to result from a uniform tension are obtained. This improvement was designed by William H. Gray, of Dover, N. H.

FOREIGN NEWS AND MARKETS.

A submarine cable of 120 miles in length has been laid through the Bass' Straits between Australia and Tasmania; thus affording good evidence of South Sea enterprise.

Steam power is coming into very extensive use on farms in England. Engines amounting to 10,000-horse power were made and sold last year. For certain kinds of work, when they can be employed on large farms, the cost for steam work is about three-fifths that of horses.

Since 1851 Messrs. Burgess & Key have sold 1,900 of McCormick's reapers, of which 771 were made last year; and at present they have four times the number of orders on hand which they had in Jan. 1859. Messrs Crosskill have sold 500 of Bell's reapers and 800 of Hussey's; Messrs. Dray have also sold 800 of Hussey's, and Messrs. Garnett have sold 600 of Hussey's and 250 of Wood's. Altogether, according to a paper recently read on the subject before the Society of Arts in London, by T. C. Morton, there were 4,000 reapers employed in England last harvest, and probably their will be twice the number used the next. Nearly all of these machines are American inventions; and among them, Hussey's seems to be the favorite on account of its simplicity. The labor of 40,000 laboring men was saved by these machines last year, and thus a great gain was effected by the farmers, while, at the same time, there was plenty of work for able farm operatives, and no reduction of wages.

On the North London Railroad several car wheels have been fitted with an elastic strip under each tire, and it has been found that much less wear and tear has been experienced. This is following in the track of some of our American car wheel builders, who set the tyres upon a continuous surface of wooden blocks. Such wheels are used on the Boston and Providence Railroad.

On most of the English railroads no means of communication have yet been furnished between the passengers and engineers, as on our American railroads, by the simple means of a rope running over the top of the cars. Mr. Mechi has written a letter to the London *Times* on this subject, and suggests that an act of Parliament be made to compel railroads to furnish such means of safety.

Railroad iron is in good demand. The Welsh rails bring £5 12s. 6d. per tun, cash. The Staffordshire rails brings £7. Staffordshire bars are selling at £7 10s., double sheet iron, £10 10s., single, £9. The best hoop is £8 10s.; round rods, £7 10s. Spelter, per tun, £22. Copper, £112, in tile. English refined tin, £142. Scotch pig iron is in steady demand, and a large business done at the rate of £2 18s. per tun. The British metal market is indeed active, and good prices ruling.

There has been a great increase of orders for brass wire at Birmingham.

NEW YORK MARKETS.

CANDLES.—Sperm, city, 38c. a 40c. per lb.; sperm, patent, 50c.; wax, paraffine, 50c.; adamantine, city, 18c. a 21c.; stearic, 27 a 28c.

COAL.—Authracite, $4.50 a $5; Liverpool orrel, per chaldron, $11; cannel, $11.50.

COPPER.—Refined ingots, 23¾c. a 24c. per lb.; sheathing, 26c.; yellow metal, 20c.

CORDAGE.—Manilla, American made, 8¾c. per lb.; Rope, Russia hemp, 12c.

COTTON.—Ordinary, 8¾c. a 9c.; good ordinary, 9¾c. a 10c¼; middling, 11¼c. a 11¾c.; good middling, 11¾c. a 12¾c.; middling fair, 11¾c. a 13c.

DOMESTIC GOODS.—Shirtings, brown, 30-inch, per yard, 6c. a 7¼c.; shirtings, bleached, 26 a 32-inch, per yard, 6c. a 8c.; shirtings, bleached, 30 a 34-inch, per yard, 7c. a 8¾c.; sheetings, brown, 36 a 37-inch, per yard, 5¾c. a 6¾c.; sheetings, bleached, 36-inch, per yard, 7¾c. a 15c.; calicoes, 6c. a 11c.; drillings, bleached, 30-inch, per yard, 8¾c. a 10c.; cloths, all wool, $1.50 a $2.50; cloths, cotton warp, 85c. a $1.37; cassimeres, 55c. a $1.37½; satinets, 30c. a 60c.; flannels, 15c. a 30c.; Canton flannels, brown, 8¾c. a 13c.

DYEWOODS.—Barwood, per tun, $16 a $20; Camwood, $120; Fustic, Cuba, $35 a $36; Fustic, Tampico, $32; Fustic, Savanilla, $19 a $20; Fustic, Maracaibo, $18.50 a $19; Logwood, Laguana, $22 a 23; Logwood, Tabasco, $21; Logwood, St. Domingo, $13 a $13.50; Logwood, Honduras, $16 a $17; Logwood, Jamaica, $12.50 a $13; Lima wood, $65 a $75; Sapan wood, $45.

FLOUR.—State, superfine brands, $5.15 a $5.25; Ohio, common brands, $5.25 a $5.30; Ohio, good and choice extra brands, $5.30 a $6.75; Michigan, Indiana, Wisconsin, &c., $5.30 a $5.50; Genesee, extra brands, $5.75 a $7.50; Missouri, $5.40 a $7.50; Canada, $5.65 a $6.60; Virginia, $6.25 a $7.25; Rye flour, fine, $3.75 a $3.90; corn meal, $3.80 a $4.20.

HEMP.—American undressed, $120 a $150; dressed, from $160 a $200. Jute, $96 a $97. Italian, $275. Russian clean, $190 a $200 per tun. Manilla, 6½c. per lb. Sisal, 5¾c.

INDIA-RUBBER.—Para, fine, 55c. per lb.; East India, 47½c.

INDIGO.—Bengal, $1 a $1.55 per lb.; Madras, 70c. a 95c.; Manilla 90c. a $1.15; Guatemala, $1 a $1.35.

IRON.—Pig, Scotch, per ton, $24 a $25; Bar, Swedes, ordinary sizes, $85 $36; Bar, English, common, $42.50 a $43; Refined, $52 a $54; Sheet, Russia, 1st quality, per lb., 11¾c. a 11¾c.; Sheet, English, single, double and treble, 3¼c. a 3¾c.; Anthracite pig, $23 per ton.

IVORY—Per lb., $1.25 a $1.30.

LATHS.—Eastern, per M., $2.

LEAD.—Galena, $5.80 per 100 lbs.; German and English refined, $5.65 a $5.70; bar, sheet and pipe, 5¾c. a 6c. per lb.

LEATHER.—Oak slaughter, light, 29c. a 31c. per lb.; Oak, medium, 30c. a 32c.; Oak, heavy, 28c. a 31c.; Oak, Ohio 29c. a 30c.; Hemlock, heavy, California, 19c. a 20c.; Hemlock, buff, 15c. a 18c.; Cordovan, 50c. a 60c.; Morocco, per dozen, $18 to $20.; Patent enameled, 16c. a 17c. per foot, light Sheep, morocco finish, $7.50 a $8.50 per dozen.; Calf-skins, oak, 55c. a 60c. per lb.; Hemlock, 55c. a 60c.; Bolting, oak, 32c. a 34c.; Hemlock, 28c. a 31c

LIME.—Rockland, 75c. per bbl.

LUMBER.—Timber, white pine, per M. feet, $17.75; yellow pine, $35 a $36; oak, $18 a $38; eastern pine and spruce, $14 a $15; White Pine, clear, $35 a $40; White Pine,select,$25 a $30; White Pine, box, $14 a $18; White Pine, flooring, 1¼ inch dressed, tongued and grooved, $24.50 a $25; Yellow Pine, flooring, 1¼ inch, dressed, tongued and grooved, $29 a $32; White Pine, Albany boards, dressed, tongued andgrooved, $20 a $21; Black Walnut, good, $45; Black Walnut, 2d quality, $30; Cherry, good, $45; White Wood, chair plank, $42; White Wood, 1 inch, $25 a $25; Spruce Flooring, 1¼ inch, dressed, tongued and grooved, each, 22c.a 24c.; Spruce Boards, 15c. a 17c.; Hemlock Boards, 12½c. a 14c.; Hemlock wall strips, 10c. a 11c.; Shingles, cedar, per M. $28 a $35; Shingles, cypress, $12 a $25; Staves, W. O. pipe, light, $55 a $5; Staves, white oak, pipe, heavy, $75 a $80; Staves, white oak, pipe, culls, $30 a $35; Staves, do. hhd., heavy, $70; Staves, do. bbl. light, $30 a $35; Staves, do. bbl. culls, $20; Mahogany—St.Domingo, fine crotches. per foot, 35c. a 45c.; St. Domingo, ordinary do., 20c. a 25c.; Honduras, fine, 12½c. a 15c.; Mexican, 13c. a 15c.

NAILS.—Cut, 3¼c. a 3½c. per lb.; American clinch, 5c. a 5¼c.; American horse-shoe, 14½c

OILS.—Olive, Marseilles, baskets and boxes, $3.35 a $3.50; Olive, in casks, per gallon, $1.12 a $1.25; Palm, per pound, 9c. a 9¼c.; Linseed, city made, 57c. a 58c. per gallon; linseed, English, 57c. a 58c.; whale, fair to prime, 48c. a 52c.; whale, bleached 59c. a 60c.; sperm, crude, $1.40 a $1.45; sperm, unbleached winter, $1.47; lard oil, No. 1, winter, 92½c. a 97½c.; red oil, city distilled, 60c.; Wadsworth's refined rosin, 30c. a 40c.; Wadsworth's boiled oil for painting, 35c a 40c.; Wadsworth's tanner's improved and extra, 30c. a 40c.; camphene, 44c. a 46c.; fluid, 50c. a 53c.

PAINTS.—Litharge, American, 7c. per lb.; lead, red, American, 7c.; lead, white, American. pure, in oil, 8c.; lead, white, American, pure, dry, 7¼c.; zinc, white, American, dry, No. 1, 5c.; zinc, white, French, dry, 7¼c.; zinc, white, French, in oil, 9½c.; ochre, ground in oil, 4c a 6c.; Spanish brown, ground in oil, 4c.; Paris white, American, 75c. a 90c. per 100 lbs.; vermilion, Chinese, $1.12½ a $1.22; Venetian red, N. C., $1.75 a $2.25 per cwt.; chalk, $4 per tun.

PLASTER-OF-PARIS.—Blue Nova Scotia, $2.75 per tun; white,$3.50; calcined, $1.20 per bbl.

RESIN.—Tarpentine, soft, N. C., per 280 lbs., $3.43¾ a $3.50; Wilmington, &c., $3.43¾ a $3.50; common, per 310 lbs., $1.62½ a $1.65; strained and No. 2, $1.62¼ a $1.90; No. 1, per 280 lbs. $2 a $2.75; white, $3 a $4; pale, $4.50 a $5.50.

SOAP.—Brown, per pound, 5c. a 8c.; Castile, 8¾c. a 9c.; Olive, 7c. a 7¾c.

SPELTER plates, 5¾c. a 5¾c. per lb.

STEEL.—English cast, 14c. a 16c. per lb.; German, 7c. a 10c.; American spring, 5c. a 5½c.; American blister, 4¾c. a 5¾c.

SUMAC.—Sicily, $70 a $80 per tun.

TALLOW.—American prime, 10¾c. a 10¾c.per lb.

TIN.—Banca, 32c.; Straits, 30c.; plates, $6.50 a $9.37½, per box.

WOOL.—American, Saxony fleece, per lb., 55c. a 60c.; American full blood merino, 48c. a 52c.: extra, pulled, 45c. a 50c.; superfine, pulled, 39c. a 42c.; California, fine, unwashed, 24c. a 32c.; California, common, unwashed, 16c. a 18c.; Mexican, unwashed, 11c. a 14c.

ZINC.—Sheets, 7c. a 7¾c. per lb.

The foregoing rates indicate the state of the New York markets up to January 18th.

Trade is becoming more lively, and there seems to be a general expectation of "good times coming" in the course of a few weeks.

There have been large arrivals of hides during the past week; but the prices for them are still maintained, and tanners seem to be cautious in purchasing for fear there may be a decline shortly. It is rather remarkable to note how distant countries are laid under contribution to supply us with hides and skins for making leather. Last week 112 bales of cow and 100 of goat hides arrived here from Calcutta, and 90 bales of goat from Lo-anda, in Africa. There is a large stock of manufactured boots and shoes on hand, and business in this department is more dull than usual at this season of the year.

With reference to the liability of insurance companies in the case of the Pemberton Mill disaster, a Boston paper says:—"If the law of this State does not conflict with the New York code on the same subject, it is apparent that the corporation can recover but a very small sum. During the great Hague-street fire in New York, a building fell from the explosion of a steam boiler, and the ruins took fire. The Hartford Insurance Company had a policy on the machinery, and a suit was brought to recover the damages done to the machinery by fire after the building had fallen. The court decided that the contract terminated the moment the building fell. The case was appealed, and the Court of Appeals sustained the decision."

ISSUED FROM THE UNITED STATES PATENT OFFICE
FOR THE WEEK ENDING JANUARY 17, 1860.

[Reported Officially for the SCIENTIFIC AMERICAN.]

. Pamphlets giving full particulars of the mode of applying for patents, size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

26,823.—Leonard Anderson, of Painesville, Ohio, for an Improved Method of Hanging Reciprocating Saws:

I claim the combination of the saw, B, with the short arm, J, of the pitman, H, pin, R, and slotted arc, F, when the upper end of the saw moves in a right line, substantially as described, so that the saw will be carried backward, during its upward stroke, but will descend on a vertical line, all as set forth.

[The nature of this invention consists in pivoting the upper end of the saw to a vertical sliding block, and the lower end to the short arm of a pitman-rod, which has its fulcrum in a block sliding in a circular groove, so that the saw in its movement will have an alternate reciprocating and at the same time a vibrating motion, and be thrown back during its upward stroke, in order that the kerf may clear itself of sawdust.]

26,824.—A. C. Babcock, of New Haven, Conn., for an Improved Curtain Fixture:

I claim the combination of the long india-rubber spring, C, with the curtain roller, B, and its appendages, when the whole is constructed, arranged, and made to operate, substantially as described and set forth.

26,825.—Albert Baker, of Appleton, Wis., for an Improved Life-preserving Raft:

I claim the combination of extension beams, C C, with central beam, A, ferrules, D D, racks, b b, pinions, a, for operating each pair simultaneously, arranged in the manner and for the purposes set forth, the whole being buoyed up out of the water by suitable bags, F, as described.

[This invention is a raft made in such a way that it can be readily taken to pieces, and folded up in a very compact and portable shape, or put together in a few minutes. When put together it will occupy a large superficial area, and have great floating capacity, not easily upset and will serve a useful purpose at sea or for pleasure purposes.]

26,826.—V. M. Baker, of Elkland, Pa., for an Improved Water Wheel:

I claim the combination of the two series of buckets, C D, and scroll, E, constructed and arranged substantially as and for the purpose set forth.

[This invention relates to an improvement in that class of water wheels in which a scroll is employed, the wheel being encompassed by the same. The invention consists in a peculiar form and arrangement of the buckets, whereby several advantages are obtained over all scroll saws, to wit, a more uniform motion, and a better combined action of the direct and re-acting force or power of the water.]

26,827.—Jesse Battey, of Honeoye Falls, N. Y., for a Machine for Directing Newspapers, &c. Ante-dated July 17, 1859:

I claim, first, The arrangement of type on slats connected together so that they may be moved successively through a machine, in the manner and for the purposes described and set forth, or any equivalent involving substantially the same principles.

Second, The combination and arrangement of lever, X X, click, a, and ratchet wheel, b, with cog wheels, R R, for the purpose of moving slats, A A, in the manner and for the purpose specified, or any arrangement accomplishing substantially the same thing.

Third, The arrangement and combination of spring, j, pulley, g h, and belt, f f, for the purpose of taking up slats, A A, or drum, P, as specified, or its equivalent.

Fourth, The adjusting springs, d d, for the purpose specified.

Fifth, I do not claim the pin, O, or lip, 10, separately; but I claim their combination and arrangement in the manner and for the purpose specified.

Sixth, Moving apron, Z, by means of cleat, 5, and click, 4, in the manner and for the purpose specified or any arrangement substantially the same.

Seventh, Drawing or moving newspapers, or other similar documents into a machine, by finger bars, I I, and spurs, 6, in the manner specified, or any arrangement accomplishing substantially the same thing.

Eighth, The arrangement and combination of arm, J, pin, 9, click, K, and bars, L and M, in the manner and for the purpose specified, or any arrangement substantially the same.

Ninth, The arrangement and combination of lever, T, clicks, x, and d y, ratchet wheel, U, pinions on shaft, 1, cog wheels, z, drums, p, belts, N, cleats, q, &c., for the purpose of elevating boxes, r r, in the manner and for the purpose described and set forth or any arrangement accomplishing substantially the same thing.

Tenth, I claim the method described of securing type in type-boxes, by means of screw, 12, and wedge block, 13, as shown in Fig. 4.

26,828.—Smith Beers, of Naugatuck, Conn., for an Improvement in Machines for Pulling and Cutting Cotton Stalks:

I claim the construction, arrangement and operation of the pulling wheels, E F, whether provided with inter-matching spokes, g g, for cutting and crushing as well as pulling, or simply arranged for pulling, and either with or without the auxiliary cutting and cleaning knives, substantially in the manner and for the purposes specified.

I also claim the gathering wheels or rollers, G G, constructed and operating as described, in combination with the pulling wheels, E E.

26,829.—August Bickel, of Philadelphia, Pa., for an Improvement in Crutches:

I claim, first, The springs, e e e, and elastic strap, f, in combination with the top-piece, a, the same being constructed, arranged and combined together, substantially in the manner and for the purpose set forth and described.

Second, I also claim the application of the spiral spring, b, to the lower end of the staff, in combination with the tube, b', and stem, c, as and for the purposes set forth and described.

26,830.—C. F. Brown, of Bridgeport, Conn., for an Improvement in Spring Rollers for Window Sashes:

I claim the combination of the frame, B, in which the roller revolves with the two springs, E E, substantially as described.

26,831.—J. A. Campbell, of Georgetown, C. W., for an Apparatus for Printing Addresses on Newspapers:

I claim printing addresses on the margin of newspapers simultaneously with the printing of the newspapers, by means of cells or boxes, l, containing the addresses set up in type and conveyed to the form, or to the bed thereof, by means of an endless apron having an automatic intermitted movement, and this I claim independently of any particular form or kind of printing-press, or means employed for operating the endless apron.

26,832.—Joseph Carlin, of Cumminsville, Ohio, for an Improved Horse-shoe:

I claim the arrangement of the projections, D, cavities, E, dovetails, b, c, F, and wedge-keys, G, constructed and combined substantially in the manner and for the purpose set forth.

26,833.—V. M. Chaffee, of Xenia, Ill., for an Improvement in Plows:

I claim, first, The double-flanged reversible cutter landside, in combination with the peculiar-shaped stand, D, and bolts, O O and Q, substantially as set forth.

Second, I also claim the arrangement of the turning plate, E, in combination with the double flanged reversible cutter landside and bolts, O O and Q, or their equivalents.

26,834.—V. M. Chaffee, of Xenia, Ill., for a Printing-press:

I claim, first, The adjustable card-box, R, constructed and arranged substantially as described.

Second, The slide, T, in combination with the catch or feed-plate, U, constructed and operated substantially as and for the purpose specified.

Third, The grooved wheel, G, in combination with the bolt, d, and pitman, J, all constructed and operating substantially as described.

Fourth, The sliding frame, F, constructed as described, and working in a line parallel to the main shaft.

Fifth, The mechanism described, or its equivalent, for the purpose of imparting to the inking rollers a double longitudinal friction against each other.

Sixth, The combination of the ratchet wheel, H', shaft, J', arm, I' and graduated plate, K', in the manner and for the purpose specified.

Seventh, I claim communicating power to a printing press by means of a combination of a cam and sliding-frame, when the main shaft to which the cam is attached is in a line parallel to the line of motion of the sliding-frame, substantially as described.

26,835—Sylvanus S. Clark, of Manchester, N. H., for an Improvement in Hay and Straw-cutters:

I claim the combination and arrangement of the crossed and connecting rods, D E, the brake, L, and the sectoral levers, F G, applied to the supporting frame and the shear cutters or mechanism, substantially the same.

I also claim arrangement the sectoral arms, brake and connecting bars above the knives, C C', and the mouth of the hopper, as represented.

26,836.—George A. Cox, of Brooklyn, N. Y., for an Improvement in Formers for Bonnet Fronts:

I claim the use or employment of the former, A, in combination with the frame composed of the parts, D E and F, when arranged and operated in the manner described and for the purpose specified.

26,837.—Benjamin F. Craig, of Washington, D. C., for an Improvement in Hot-air Engines:

I claim the introduction into the cylinder of a hot-air engine, of two separate bodies or currents of gaseous matter, one of which is much cooler than the other, and the hotter of which is controlled and limited by the action of the cooler and by the form and arrangement of the piston and cylinder to such an extent as that it does not come into contact with those working parts which its heat would injure, substantially as described.

26,838.—Pearson Crosby, of New York City, for an Improvement in Filing Saws:

I claim the bar, A, with the slide, B', transverse plate or file-holder, C, provided with the file, D, and the set screws, E E, or their equivalents, to form a new and useful implement for the purpose set forth.

[This invention consists in the employment or use of a bar provided with an adjustable slide, a stationary clamp or holder in which the file is secured, and adjusting or gage screws; the parts being so arranged that the sides of the teeth of the saw may be filed so as to form a "set" of equal width throughout the whole length of the saw, and also to render the cutting action of the saw far more efficient than hitherto.]

26,839.—Valorus Drew, of New York City, for an Improved Shade Fixture:

I claim, first, The two cords, C E, connected by the ring, D, and arranged as shown, to wit, the cord, C, passing around the roller, B, and the cord, E, provided with the eye, F, and attached to the jamb of the window casing, substantially as and for the purpose set forth.

Second, The sliding journal, f, fitted in the roller, B, provided with the slot, e, so arranged relatively with the journal, f, as to admit of the adjustment of the same for the purpose specified.

Third, Attaching the shade, G, to the roller, B, by means of the headed elastic rod, i, fitted in the hem of the shade and secured into the groove or recess, g', of the roller by means of the staples, h, in connection with the tape, H, provided with the knot, k, as described.

[This invention consists in a novel way of arranging the cord by which the shade roller is turned, whereby the cords may be kept at a proper degree of tension in order to insure the rotation of the roller, and also readily slackened to facilitate the removal, when required, of the roller from the window casing. The invention also consists in a novel way of securing the roller in the window casing, whereby all metallic fixtures, except the journals, are dispensed with, and the roller readily adjusted in and detached from the casing. The invention further consists in a novel way of attaching the shade to the roller, whereby the former is not only firmly secured to the latter, but also rendered capable of being detached, with facility, for the purpose of being washed when required.]

26,840.—Eugene Duchamp, of St. Martinsville, La., for an Improvement in Scaffolding:

I claim the arrangement and combination with the crossties, F, and poles, A, of the adjustable brackets, B, and straps, C, substantially as and for the purposes shown and described.

[This invention is an improvement in hanging and supporting scaffolds for builders, painters, carpenters, plasterers, and other work in which ladders cannot be practically employed; so that the scaffold will be held or secured in a perfectly steady position near the building which is to be repaired, and at the same time so that the foot boards can be readily adjusted to any hight required, without using either ropes or nails for retaining the parts together.]

26,841.—Josiah P. Fitch, of New York City, for an Improved Churn:

I claim, first, The curved guard F, arranged on the dasher shaft, and moving with the same, in combination with the peculiar shaped dasher and churn tub, in the manner and for the purposes described.

Second, The hand rest, E, when made adjustable, in combination with the guard, D, churn tub, A, and dasher, B, in the manner described.

26,842.—Wm. Franklin, of New Haven, Conn., for an Improvement in Pantaloons:

I claim the combination of upright elastic ribs with the legs of the pantaloons, by means of a lining or its equivalent, by which the ribs are secured in place, in contra-distinction to attaching them directly

to the material which forms the surface of the legs of the pantaloons.

I also claim the combination of hair cloth or its equivalent with elastic ribs and with the legs of the pantaloons, in such manner that the direction of the hair is crosswise to the lengths of the ribs.

26,843.—Leonard Gillett, of North Colebrook, Conn., for an Improved Method of Raising Water:

I claim the arrangement, as described, of a pump, B, weighted piston, E, pipe, G, self-discharging bucket, I, and lever, H, substantially as and for the purpose described.

26,844.—Austin S. Hart, of Buffalo, N. Y., for an Improvement in Faucets:

I claim the arrangement of the spring, C, valve, D, and pipe, B, within the chamber, A, and screw, E, above the chamber, for the purposes and substantially as described.

26,845.—George G. Henry, of Mobile, Ala., for an Improvement in the Manufacture of Oil from Cotton Seed:

I claim my improvement in the treatment of cotton seed by which oil, oil cake and manure are obtained therefrom, in the manner and for the purposes substantially as described.

26,846.—James Buchanan Henry, of New York City, for an Improved Method of Riveting Boiler Plates:

I claim the use of plates with an increased thickness imparted to their edges, when said plates are so lapped that the same rivet passes through both plates, substantially as described.

26,847.—Jacob Hibbard, of Hermitage, N. Y., for an Improved Feed Water Apparatus for Steam Boilers:

I claim the arrangement of the rotating feed plug, C, receiving its water on one side and discharging it into the boiler on the other; the operation being performed by the continuous rotation of the plug; all in the manner and for the purpose substantially as set forth.

26,848.—R. W. Hill, of Naugatuck, Conn., for an Improvement in Skeleton Skirts:

I claim attaching to a hoop skirt made in any of the usual forms, an additional hoop or hoops placed obliquely to the rest, and united to them by flexible joints, substantially in the manner and for the purpose specified.

26,849.—John Hively, of Dayton, Ohio, for an Improvement in Flower Pots:

I claim the combination of the pot, A, flange, B, and removable bottom, C, either with or without the screen, D, for the purposes set forth, substantially as described.

26,850.—Charles W. Kimball, of Springfield, Mass., for an Improvement in Steam Gages:

I claim the application to dial or clock-faced steam gages of the cam, lever and wire, or their equivalents, for the purpose of giving an alarm, substantially as set forth.

26,851.—John Larkin, of Thibodeaux, La., for an Improvement in Evaporators for Sugar Pans:

I claim first, The combination with and within the pan, B, or its equivalent, of the two independent series of swinging steam pipes, substantially as shown and described, so that while one series is elevated to be cleaned, the evaporating process may be continued with the other series, as set forth.

Second, The combination of the horizontal pipes, A C, by means of the arched series of pipes, c, as and for the purpose set forth.

Third, The arrangement of the extremities of the supply pipes, D E and A A', to slide one over the other when the said extremities are combined with the stuffing boxes, d d' b b' attached to the pan, B, substantially as shown and described, whereby expansion is allowed and leakage prevented, as set forth.

[This invention consists in a certain arrangement of the steam pipes in a vessel for evaporating by steam, whereby, while convenience is afforded for raising the pipes to clean them or the bottom of the vessel, provision is made for the various degrees of expansion to which the several portions of the pipes are subjected during the heating, boiling or evaporating process.]

26,852.—Wm. S. Mackintosh, of Pittsburgh, Pa., for an Improvement in Oscillating Steam Engines:

I claim, first, The within-described arrangement for counteracting the pressure of the steam against the sides of the cylinder next the side pipe, by means of a piston or valve applied within the side pipe or steam chest, and connected by a system of levers with a pin or its equivalent arranged to press against the trunnion on the opposite side of the cylinder, substantially as described.

Second, Providing cavities near the exhaust ports of the side pipe and pipes or passages communicating between the said cavities and induction chamber, substantially as and for the purpose herein specified.

26,853.—Wm. S. Mackintosh and James Hemphill, of Pittsburgh, Pa., for an Improvement in Oscillating Steam Engines:

We claim so applying the piston, E, in relation to the trunnion, a, and so conveying steam to act upon the said piston that it may be forced by the pressure of such steam directly towards the end of the trunnion, to counteract the pressure of the steam against the opposite side of the cylinder, substantially as described.

26,854.—Charles McBurney, of Roxbury, Mass., for an Improved Apron for Printing Presses:

I claim a blanket for printing machines having a fibrous surface, as set forth, operating as described.

26,855.—Thos. H. McCray, of Tellico, Texas, for an Improvement in Presses:

I claim the combination of the keys, C C, or their equivalents, movable to different notches or positions in succession with a revolving cam, substantially in the manner and for the purposes specified.

26,856.—T. Cato McKeen, of Nashville, Tenn., for an Improvent in Buoying Ships:

I claim the arrangement of the longitudinal main, C, running fore-and-aft the vessel, when employed in combination with the air reservoir, A, central conducting pipe, D, lateral branch pipes, E, and bags, F, as shown, so that the bags may be simultaneously inflated on both sides and along the whole length of the vessel, as set forth.

26,857.—Washington Morton, of Friendship, Maine, for an Improvement in Reefing Fore-and-aft Sails:

I claim combining, substantially as described, a single reefing line and two sets of leading eyes together with one side of the sail, its reef band and front rope, the rope in such case not being carried through the sail.

And in combination or connection with the same, I claim the straining rope, arranged and applied to the reef band and the boom, substantially as and for the purpose as specified.

26,858.—Eli Mosher, of Flushing, Mich., for an Improvement in Sap Conductors:

I claim a sap conductor provided with the sharp edge, B, and side prongs, a a, as shown and described.

[This invention consists in arranging a sap conductor with two prongs or barbs, and with a sharp edge between said prongs, so that it can be driven into a tree at any place without causing any material injury to the tree, and at the same time the joint between the tree and the conductor is perfectly tight.]

23,859.—Adam Odell, of New York City, for an Improvement in Attaching Thills to Vehicles:

I claim the use of the flat-headed bolt, C, in combination with the clip-holder, A, and thill iron, B, made and operating in the manner and for the purposes set forth.

26,860.—Samuel J. Olmsted, of Binghampton, N. Y., for an Improved Machine for the Manufacture of Tin Ware:

I claim, first, Having the die-holding shaft, G, so constructed and arranged upon the step, F, and in the slot of the standard, E, as to allow the die, H, to be elevated or lowered, moved forward or backward and rotated, as set forth.

Second, I claim the so-arranging of the shaft, J, within its supporting frame and boxes as to allow of its vertical and longitudinal adjustment, for the purposes described.

Third, I claim the rollers, R R' R'', as combined with the setting down roller, Q, and the circular die, H, constructed and operated as described, whereby I am enabled to "set down," "double-seam" and "dish," or deface the bottom of the ware at one operation and without removing the ware from the die, as set forth.

26,861.—Du Bois D. Parmelee, of Salem, Mass., for an Improvement in the Manufacture of Elastic Hollow Molded Articles:

I claim forming, in a permanent manner, the shape of such articles, by cementing sheets made of rubber, or its equivalent, or their compounds, to form a bag of a shape approaching that of the intended article, and arranging the same in molds provided with a mouth or opening, and forcing there through and into the bag, air or any other fluid at the ordinary temperature, substantially as set forth.

26,862.—Anson H. Platt, of Cincinnati, Ohio, for an Improvement in Soap:

I claim the use of the ingredients and proportions thereof for a composition for soap, substantially as described.

26,863.—T. C. Richards, of Milwaukie, Wis., for an Improvement in Blowers:

I claim a blower composed of an inner cylinder and outer case, connected by leather or other flexible substance, C D, arranged substantially as described, to form two or more chambers between them, such chambers being provided each with one or more inlet valves to admit air from without and with one or more outlet valves communicating with a common discharge pipe, and the inner cylinder having a circular motion within the outer case without rotating on its own axis, all substantially as set forth.

[This blower consists of two or more chambers formed between an inner cylinder and an outer case, by closing the space between them by means of flexible material so applied as to connect the ends of the cylinder with the outer case, and dividing said space lengthwise of the cylinder by partitions of flexible material, such chambers, formed between said partitions, being provided with suitable inlet valves by which they receive air from the exterior of the outer case, and with outlet valves by which they communicate with a common discharge pipe. By giving the inner cylinder a movement of such character as to make it approach and recede from every part of the outer case in succession, the chambers are in turn expanded and contracted and so made to collect the air from without the outer case, compress it and deliver it into the common discharge pipe, from which it is discharged in a constant stream.]

26,864.—John Russell, of Grampian Hills, Pa., for an Improvement in Harrows:

I claim the arrangement of triangular harrows, A A A A, and bolts, a a, with the shield, d, the whole being constructed as and for the purpose specified.

26,865.—Albert M. Smith, of New York City, for an Improvement in Pocket Match Safes:

I claim, first, The so-constructing a portable or pocket match safe for holding matches in to be carried in the pocket, that the matches will fall down by their own weight into a position contiguous to the hole or place they are to pass out at, whereby one at a time can be extracted from it without opening the safe.

Second, I claim the arrangement, in combination, for pushing the end of the match out of the safe sufficient to take hold of it.

Third, I claim so constructing it and arranging a rough surface in such close proximity to the hole or place in the safe the match is to pass out at that, after the match has been pushed partly out by taking hold of it with the fingers and drawing it completely out, it can at the same time be brought against the rough surface in the ordinary manner matches usually are to ignite them, so as to ignite it.

Fourth, I claim the construction and arrangement for keeping the matches from coming out of the safe while being carried in the pocket, substantially as described.

26,866.—Kirby Spencer, of Minneapolis, Minn., for an Improved Seat for Water-closets:

I claim the combination and arrangement of the slot, F F, with the projecting handles with straight and bent shanks, E and G, the bent plate, G G', the combined groove, A A, formed by the rabbeting, B, in the front and the groove, A A, in the top, the plate, A, the panel, h h h h, the chamber, I, and the easement, F M, constructed in the manner described and represented and for the purpose specified.

26,867.—Edward P. Torrey, of Jersey City, N. Y., for an Improvement in Ice-cream Freezers:

I claim the arrangement and combination within the freezing vessel of the rigid scraper, E, and the inclined beating slats, C, so that the cream will be cut clean from the interior surface of the can, and as fast as removed will be whipped and lifted by the inclined slats, C, and spread over the surface of the can, as specified.

I also claim the arrangement and combination of the crossbar, F, with the bottom of the tub or barrel, G, and the bottom of the can, A, as and for the purpose specified.

[This invention consists in arranging the beater with a rigid scraper on one side and with a series of smooth inclined slats on the other in a cylindrical can, which, by means of a socket in its bottom and by a boss on its cover, forms the proper bearings for the stem of the beater, and which is provided with legs or projections at its bottom which fit over a crossbar in the bottom of the barrel or tub in which the can is placed. By these means the can is prevented from turning, and at the same time it is kept in an upright position without causing any strain on the cover of the barrel.]

26,868.—Hiram Tucker, of Cambridgeport, Mass., for an Improved Portable Roof Covering:

I claim, as a new article of manufacture, the composite waterproof roof covering described, the same consisting of a central web and layers of waterproof mixture adhering to both sides thereof, one or both of which layers are covered with a film formed by the evaporation of a wash, substantially as described.

26,869.—Oliver E. Weston, of Roxbury, Mass., for a Printing Press:

I claim, first, The combination, with the horizontally-moving type bed, B, and platen, N (of a hand press), of a horizontally-moving frisket, P, arranged and operated substantially as and for the purpose shown and described.

Second, I claim the combination of the inking apparatus and frisket, P, with the shaft, F, substantially as and for the purpose shown and described.

Third, I claim the employment of the frisket as a "fly" for the sheets, substantially as shown and described.

Fourth, The employment, in combination with the platen and type bed, of the adjustable bearing screws, m', to equalize the force of the platen, as shown and described.

26,780.—John W. Wheeler, of Cleveland, Ohio, for an Improved Method of Elevating and Delivering Water from Wells:

I claim operating the valve in the bottom of the bucket by the rear end of the trough; the lever actuating the trough being moved by the bucket, and the trough having a more rapid advance than the bucket, as set forth.

26,871.—Enos G. Allen, of Boston, Mass. (assignor to Henry O. Allen, of Malden, Mass.), for an Improvement in Steam Gages:

I claim the use, in gages for indicating the pressure of steam or of other fluid, of a volute spring, the coils of which are of uniform thickness throughout, and which taper in width on one side only, in combination with the rubber disk or diaphragm, as set forth.

26,872.—C. R. Bellows, of Seneca Falls, N. Y. (assignor to himself and Abraham Orvis, of Niagara City, N. Y.), for an Improvement in Rope-making Machines:

I claim the arrangement of the internally-toothed rack, B, spur wheel, D, driving shaft, C, flying spindle, E, toothed flanged flyers, F, and bobbins, d, in combination with, and in the relation specified to, the other described mechanism which controls the cord or rope after it is made, substantially as and for the purpose set forth.

[This invention consists in a novel method of giving rotary motion to the strand bobbins, both upon their own axis and around the laying spindle.]

26,873.—S. G. Crane, of Rochester, N. Y. (assignor to himself and Conrad B. Denney, of same place), for an Improvement in Friction Sash-supporters:

I claim the combination of the prime supporting spring, b, and auxiliary spring, c, or its equivalent, applied to a sliding sash or window, substantially in the manner and for the purpose described.

26,874.—De Grasse Fowler and Thaddeus Fowler, of North Branford, Conn. (assignors to themselves, Samuel Maltby and Gustavus R. Elliott, of same place), for an Improvement in Making Coated Iron Pins:

We claim finishing coated iron pins by the rolling and compressing operation, substantially as specified.

26,875.—Wm. H. Gray, of Dover, N. H. (assignor to Luther Robinson, of Melrose, Mass.), for an Improvement in Power Looms:

I claim, first, The employment, in combination with an upright shaft, E, geared with the yarn beam, and a spring applied to the said shaft to act upon it longitudinally in opposition to the tension of the warp, substantially as described, of a wheel, I, a lever, J, carrying a pawl, w, and having an inclined face, v, and a fixed stop, x, or their equivalents; the whole applied and operating substantially as and for the purpose specified.

Second, Attaching the roller, p, to the lever, H, by means of an oscillating frame, p', substantially as and for the purpose described.

Third, The rod, q, furnished with a collar, u, the spring, r, and the strap, s, applied in combination with each other and with the lay, and the peculiarly-constructed lever, J, substantially as and for the purpose specified.

26,876.—Frederick S. Otis, of Brooklyn, N. Y. (assignor to A. B. Chapman, of New York City), for an Improved Clasp for the Ends of Bustle Hoops:

I claim the clasp, a, formed with the teeth, 2 3, to penetrate the galloon, and confine the end of the tongue, 2, when bent back around the end of the bustle hoop, as and for the purposes specified.

26,877.—John Sloan, of Pittsburgh, Pa. (assignor to E. H. Dierker and Wm. Wasecll, of same place), for an Improvement in Distilling Apparatus:

I claim the arrangement of the heating pipe, d, condensing pipe, f, conducting pipes, e f i and j, stirrer, i, and governor, in connection with the vessels, a b c and x, when arranged and constructed substantially as described, for the purpose of distilling and brewing.

ADDITIONAL IMPROVEMENT.

Sylvanus Richardson, of Jericho, Vt., for an Improved Water Wheel. Patented May 17, 1859; additional improvement dated Jan. 17, 1860:

I claim the application of the three-cornered piece within the scroll case, constructed as described for the purposes set forth.

RE-ISSUES.

Tyler Howe, of Cambridgeport, Mass., for an Improvement in Bed Bottoms. Patented June 13, 1854; re-issued Jan. 17, 1860:

I claim the spring bearers, B B, and rocker links, c, in combination with the bed frame, essentially as described.

And I also claim combining the spring bearers, B B, together and with the frame in lateral directions, by means of wire and staples, in combination with connecting said bearers at their ends to such frame by means of rocker links, all substantially as specified, and for the purpose of forming a mattress foundation of bar springs, whose parts shall readily accommodate themselves to the varied strains induced by a person's body lying upon them, and that without injurious strain upon one another.

Thomas Mitchell, of Lansingburgh, N. Y., for an Improved Machine for Finishing Hair-brush Handles. Patented June 28, 1859; re-issued Jan. 17, 1860:

I claim, first, The employment, in combination with the brush clamp, G, or pattern, H, or their equivalents, of a wheel, D, which is provided with V or gouge-shaped cutters, b, or their equivalents, and which set upon the wood substantially as and for the purpose shown and described.

Second, The combination with the pattern, H, of the brush clamp, of a supporting lodge or projection, a, or its equivalent, as and for the purpose shown and described.

Third, The combination of the guide, F, with the clamp, G, and cutter, D, as and for the purpose shown and described.

Fourth, Centering the unfinished brushes in the clamp, G, by means of the bristles, l, in connection with the strip on plate, J, and the inner curved edge, H, or its extension, H', substantially as described.

[This invention consists in the use of rotating cutters, guards and guides and clamps, combined with patterns peculiarly constructed, whereby the backs or stocks of brushes may, by a very simple manipulation, be expeditiously shaped or cut out in proper form.]

Wm. H. Tambling, of Berlin, Wis., for an Improved Washing Machine. Patented Oct. 11, 1859; re-issued Jan. 17, 1860:

I claim the employment of the bars, a a, provided with pins, n n, when used in connection with a box or cylinder provided with buckets, substantially as and for the purpose specified.

I do not wish to confine myself to this or any other form of buckets, but claim the whole principle of dipping and pouring water in whatever form the buckets may be made or in whatever way they may be attached to the machine.

NOTE.—The above list of patents issued this week indicates quite a falling off in numbers compared with previous weeks. It is, however, no evidence of a decrease in the number of applications for patents. In explanation of this we would state that just before the Commissioner's report, which is made to Congress about the 1st of January, the Examiners in each room are desirous to show their respective departments well worked up, and consequently labor with extra vigor to achieve this end. The consequence of this extra service is a large increase of issues at the close of the year. The above list shows that FIFTY-SIX patents were issued last week, and, of this small number, we find TWENTY of them were cases which were prosecuted through this office.

Notes & Queries

A. F., of Minn.—It requires about one pound of water per minute in the boiler of an engine for a horse power. The amount of power required to grind 15 bushels per hour depends on the character of the machinery, either with large or small stones. With stones 4 feet in diameter, making 120 revolutions per minute, it takes 4½-horse power to grind 5 bushels of wheat per hour.

S. H. A., of N. Y.—There is no substance in the composition of German erasive soap which should render its suds injurious to plants and other vegetation. Those who have found it injurious, and to whom you have referred, perhaps used hot soap suds, which are injurious to plants, no matter what may be the composition of the soap.

J. A. S., of Ind.—It would take up too much of our space to describe the whole process of electroplating, and without engravings it would not be very intelligible. The art of electroplating was illustrated in Vol. III. (old series) of the SCIENTIFIC AMERICAN. The silver solution for plating is obtained by adding sulpho-cyanide of potassium to nitrate of silver. A large quantity of the sulpho-cyanide is used to hold the silver in solution.

D. W., of Ohio.—You state that your boiler "primes" very often, and that much dirt is carried over with the steam into the cylinder, injuring both the valve and the piston packing. You also state that there is no dome on your boiler, and you wish to know if a dome put upon it, with a pipe extending down to the bottom of the water in the boiler, would afford a remedy. We believe it would. Give your steam more room by putting a dome upon the boiler, and you will have much less priming than with the narrow steam space you now have in the boiler. You should endeavor to obtain pure water for feed, and then you would never be troubled with grit and sand in the boiler.

A. T. L., of Ga.—Chloride of silver is found native, and is called "horn silver." It is also produced artificially by adding common salt brine to a solution of nitrate of silver. It falls down in a white curdy deposit. Paper charged with a solution of chloride of silver is very sensitive to light, and is used by photographers in preparing sensitive paper for taking positive pictures.

E. J. D., of Pa.—The manufacture of the explosive compound to which you refer should be conducted in a remote country place. We do not know the cost of the machinery that would be required.

J. D. J., of Mich.—The reason why air heated in a furnace is very drying is because its capacity for moisture is increased. Warm air will hold more water than cold air. You will find this subject fully discussed on page 415, Vol. I. (new series) of the SCIENTIFIC AMERICAN.

G. W. R., of Ind.—There is no good practical work on milling and millwrighting suited to the present time. Information on this subject is much sought after.

C. D., of Mass.—It is our opinion that a powder engine would be more expensive to operate than a steam engine. We must tell you, however, in candor, that we have no faith in your success.

O. C. S., of N. Y.—Band saws, passing over two pulleys and working vertically, are quite old and not patentable. You will find a self-adjusting belt saw of this character illustrated on page 241, Vol. XIV. (old series) of the SCIENTIFIC AMERICAN.

M. A. H., of N. Y.—The fumes arising from the escape of tar and the washings of gas made from coal, are injurious to health, when inhaled; and no person should sleep in a house where such fumes are admitted from common sewers, as in your case.

B. S., of Md.—Your article will appear in our next.

J. M., of Vt.—As you have not described to us the process by which you make oil from peat, of course we cannot tell you whether there are other better methods or not. We do not know how much oil may be obtained from a cord of wet peat, nor what it would bring per gallon, in this city. If equal to coal oil it would being one dollar per gallon at retail, and about 86 cents at wholesale.

A. H., of Conn.—The best way known to us for clarifying lard oil which has been used on machinery, is to heat it to about 212° Fah.; then filter it through charcoal.

P. R., of Iowa.—The gum which fills up the pores of burr stones, in grinding wheat, is vegetable gluten. It may be removed by a liberal application of hot water; but its removal cannot obviate the necessity of dressing the stone, as the surface becomes too smooth for grinding after being used for some time.

S. M., of Mo.—You can purchase "Brewster's Optics," or "Dick's Practical Astronomer" in St. Louis. Either of these works will give you the information desired about polishing lenses.

G. N., of C. E.—The "paying out" of a submarine cable through a ship's bottom is not now patentable. A patent was granted for this method of laying cables to Capt. Samuels, of this city, master of the clipper ship "Dreadnaught," in 1857.

W. S. C., of Pa.—Good wrought-iron tubing will resist the passage of mercury through it, at a pressure of 200 pounds on the square inch. Cast-iron would be rather porous for such a pressure. If the mercury is heated to 650° it will assume the gaseous condition, and would leak through tubes under such a pressure.

D. B. K., of Texas.—The models, drawings and specifications of all rejected cases are retained at the Patent Office.

D. A. W., of Mich.—Machines made under an extended patent must be stamped with the date of the original and the extended patent. The subject of artesian wells is discussed in this week's number.

O. H. P. W., of Ark.—The phenomena of electricity being generated by the leather belts used for driving machinery, is old and well known. In factories located in dry situations, you may witness a stream of electric light flowing from any belt, by holding your finger close to it.

R. M. P., of Mass.—The way to restore the temper to steel is, first, to harden it by heating it to a cherry-red color and dipping it in cold water; then the temper is to be drawn, by moderately heating it, when the brittleness diminishes as the temperature is raised. In this way you may give it such hardness as will adapt it to your purpose.

J. H. B., of N. C.—The application of the common slide valve to oscillating engines is, in our recollection, at least 20 years old, and how much older we we cannot say. We consider it now the most durable kind of valve for such engines, but its application with the valve gear for working it makes an engine much more expensive than the trunnion valves used by Reed and others, especially as those work very well.

MEXICO.—There is no white substance known to us used for pointing friction matches, that does not contain some phosphorus, and that ignites and burns freely when rubbed on a rough surface. Matches saturated with a white resin, such as balsam, or with stearine, can be ignited without phosphorus, by being tipped with the chlorate of potassa, the oxyd of zinc, sulphur and niter, but phosphorus is the most sure igniting agent for such matches, because it takes fire at such a low temperature.

B. J. V. M., of Pa.—We are obliged to you for the information regarding the "Tyler wheel;" we have heard very favorable reports of it from various quarters, and will publish the account as soon as we receive the report of the experiments at Philadelphia, from Mr. Birkenbine, chief engineer. It will be the most interesting information regarding the performances of turbine wheels ever published in this country.

S. S., of Ohio.—We have never seen diamonds employed for dressing millstones, nor do we think that millers can afford to use them. They are principally used for cutting glass, drilling holes in rubies, china and crystal, and ruling medals, &c. The natural diamond is sometimes cemented in the holder with shellac, sometimes with soft solder fused by the blowpipe, and in some tools it is pinched in with pressure upon the brass of its seat. The diamond will stand the heat of a spirit lamp and a common blowpipe.

T. H., of Texas.—So far as we know the old-fashioned lime kiln is very efficient and as good as you can use. The fuel is laid in alternate layers with the limestone, and the carbonic acid is driven off by the heat, when the fuel is ignited. If possible the sides should be of brick or stone, and made quite thick in order to retain all the heat.

A. G., of Iowa.—In erecting the pyramids, the ancient Egyptians had not the remotest idea of employing them for protecting their lands from the sands of the desert. They were erected to preserve the memory of Egyptian kings and their families, and those who descended from the Pharaohs had recourse to these monuments to prove their royal pedigree. They were no doubt also associated with the ancient Egyption religion.

E. J. C., of Miss.—An American bushel contains 2,150.42 cubic inches; a gallon, 231 cubic inches. A quart contains 57.75 cubic inches; therefore a bushel for measuring corn contains 35.50 wine quarts, very nearly.

E. P., of Pa.—We do not discover anything patentable in your invention. The device is nothing but a double action pump, without any special novelty, and the only thing, besides, to patent is the exhaustion of the air from the boiler, which is no new effect, as when a boiler cools down there is always a more or less perfect vacuum in it, according to the tightness of the valves, unless it is furnished with vacuum valves, and you have this vacuum when you start to raise steam again. You over-estimate whatever slight advantage there may be in exhausting the air from the boiler before getting up steam, for though steam is generated in a vacuum at a low temperature, such steam has no pressure, for so soon as pressure commences a vacuum no longer exists. We do not consider that any important result would be produced by your invention.

CLINTON, of N. Y.—Fulminating mercury is used for charging percussion caps. The best process for making this is the following:—Dissolve one pound of mercury in 10 pounds of nitric acid, of a specific gravity of 1.4, at a temperature of 130°, and pour the solution into a large vessel containing 10 pounds of alcohol of a specific gravity of 0.33. When the resulting effervescence has ceased, turn the mass upon a double filter fitted into a porcelain funnel, and wash it thoroughly with cold water; then dry it on plated stoneware at a temperature of 212°

T. McK., of Va.—We, too, have heard that the hand may be placed on the bottom of a kettle in which water is boiling without burning the hand. If you will try the experiment, and find out whether it is really so, we will then see if we can find an explanation for it.

E. K. C., of N. Y.—The only way known to us of dissolving cotton is to convert it into collodion, as follows:—Put an ounce and a half of rectified ether in a two-ounce stoppered bottle; add ten grains of green cotton to it, and agitate for some time, when it will dissolve. You also wish to know how to make a perfectly white, elastic and insoluble substance resembling horn. The only way to make such an article, is by bleaching gutta-percha with chlorine. This is done by boiling gutta-percha in water containing some chlorine, or submitting it to the action of chlorine gas when in a dissolved state. This must be done in a close vessel.

O. T., of Ill.—Your idea that the open Polar sea and the aurora borealis are both caused by volcanoes does not appear to us very plausible. Still, you have as good right to your theory as anybody has to theirs.

G. R. H., of Mo.—You ask, "Is it true that, is built across a stream so far down that its top is on a level with the bottom of one above, a rain of nine inches (or any given depth) will raise the stream higher above the upper dam than it would before the lower dam was built?" We answer, it will not.

F. A. H., of Ill.—The use of mechanically compressed air as a motive agent attracted much attention in England about the year 1845, though not at that time, by any means, a novelty. It was tried on a railroad in the manner substantially as you propose, but could not compete in economy with steam. We, however, think it probable that it might be used to some advantage on city roads, and such has even been proposed recently in Philpdelphia, but nothing more could be patented in this application of it than the construction or arrangement of the engine or apparatus.

Money Received

At the Scientific American Office on account of Patent Office business, for the week ending Saturday, Jan. 21, 1860:—

H. M., of Ohio, $25; S. C. L., of N. Y., $25; H. W. N., of N. Y., $30; P. Y. C., of Ga., $30; J. B. S., of Pa., $25; G. C. D., of Ohio, $30; A. B., of N. Y., $160; M. B., of N. Y., $55; H. F., of Vt., $30; A. H., of Ill., $30; J. S., of Mass., $100; H. W. P., of N. Y., $50, C. & L., of Ind., $55; D. G., of Ill., $30; O. S., of Iowa, $30, H. E., of Pa., $30; G. & W., of Mich., $20; S. M. W., of Mich., $40; J. J. P., of Ind., $25; E. M., of Ind., $30; L. C., of Mass., $30; F. F. M., of N. Y., $130; W. S., of N. Y., $25; V. O. & I. R. S., of Pa., $25, P. G. W., of Pa., $30; F. D., of Conn., $30; J. C. H., of Miss., $25; F. & B., of Pa., $30; J. C., Jr., of N. Y., $20; T. H. W., of Mass., $250; E. P. G., of Iowa, $20; C. P., of N. J., $30; L. G., of N. Y., $30; H. & S., of R. I., $10; W. W. P. & Co., of N. Y., $22; C. G. M., of N. Y., $30; F. D. B., of Mass., $30; W. L. G., of N. Y., $30; W. G. G., of Mass., $25; J. B., of N. J., $55; W. L. F., of N. J., $25; J. L. R., of N. Y., $30; R. & S., of Ohio, $25; J. S. R., of Ill., $10; G. P., of Pa., $30; F. C. L., of N. Y., $30; H. B. F., of N. Y., $25; T. S. W., of N. Y., $55; S. C. S., of Ill., $30; A. H., of Iowa, $15; E. P. M., of Mass., $250; D. K., of Pa., $30; F. J. H., of N. Y., $30; L. F. F., of N. J., $30; N. L., of Conn., $10; T. H. McC., of Ill., $30; R. R., of Vt., $30; M. H., of Conn., $30; F. & M., of Mass., $25; B. E. O., of Ill., $30; G. W. D., of N. Y., $12; L. S. L., of R. I., $30; W. E. F., of Mass., $30.

Specifications, drawings and models belonging to parties with the following initials have been forwarded to the Patent Office during the week ending Saturday, Jan. 21, 1860:—

V. O. & J. R. S., of Pa.; H. H. T., of N. Y.; F. C. L., of N. Y.; N. L., of Conn.; F. & M., of Mass.; W. L. F., of N. J.; W. G. ..., of Miss.; S. C. L., of N. Y.; P. & H., of N. Y.; J. B. S., of Pa.; W. G. M., of N. Y.; W. S., of N. Y.; E. M., of Ind.; H. B. F., of N. Y.; G. B. C., of N. Y.; H. W. P., of N. Y. (2 cases); J. McC., of N. J.; P. M., of Ill.; J. J. P., of Ind.; R. & S., of Ohio; G. W. D., of N. Y.

Literary Notices.

THE YEAR BOOK OF THE FARM AND GARDENER, for 1860, with numerous illustrations. A. M. Spangler, publisher, Philadelphia.
This is just such a work as every farmer and gardener will delight to have. Price 25 cents.

CHARLESTON (S. C.) MEDICAL JOURNAL. By J. Dickson Burns, M. D.
This is an able medical journal, and deserves well the support of the profession. Published bi-monthly, at $4 per annum.

THE MINING MAGAZINE (monthly). W. P. Blake, editor, No. 1 Spruce-street, this city.
This journal is devoted to geology, mineralogy, metallurgy, chemistry and the arts, in their application to mining, &c. It is a valuable work. $5 per annum.

HINTS TO OUR READERS.

VOLUME I., BOUND.—Persons desiring the first volume of the New Series of the SCIENTIFIC AMERICAN can be supplied at the office of publication, and by all the periodical dealers. Price, $1.50; by mail, $1.60. The volume in sheets, complete, can be furnished by mail. Price $1.

BINDING.—We are prepared to bind the volume, just closed (Vol. I., New Series) in handsome muslin covers, with illuminated sides, and to furnish covers for other binders. Price for binding, 50 cents. Price for covers by mail, 50 cents; by express, or delivered at the office, 40 cents.

INVARIABLE RULE—It is an established rule of this office to stop sending the paper when the time for which it was prepaid has expired, and the publishers will not deviate from that standing rule in any instance.

PATENT CLAIMS—Persons desiring the claim of any invention which has been patented within 14 years can obtain a copy by addressing a note to this office, stating the name of the patentee, and date of patent when known, and enclosing $1 as fee for copying.

INVENTORS SENDING MODELS to our address should always enclose the express receipt, showing that the transit expenses have been prepaid. By observing this rule we are able, in a great majority of cases, to prevent the collection of double charges. Express companies, either through carelessness or design, often neglect to mark their paid packages, and thus, without the receipt to confront them, they mulct their customers at each end of the route. Look out for them!

GIVE INTELLIGIBLE DIRECTIONS—We often receive letters with money inclosed, requesting the paper sent for the amount of the enclosure, but no name of State given, and often with the name of the post-office also omitted. Persons should be careful to write their names plainly when they address publishers, and to name the post-office at which they wish to receive their paper, and the State in which the post-office is located.

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IMPROVED STEAM COOKER.

The annexed cut illustrates an improvement in apparatus for cooking by steam, the principal object of the improvement being to permit the steam to come in direct contact either with the articles to be cooked or with the vessels which contain them, or to be shut off at pleasure. Fig. 1 is a longitudinal section of the apparatus and Fig. 2 a cross section, A A being the ovens, B B the water pans which are fitted to set into the top of an ordinary stove, and C C the steam space about the ovens. A pipe, D D, leads from the top of each water pan to the middle of each oven, being opened and closed by the stop cocks, E E. The pans containing the substance to be baked are placed on the shelves, F F, of perforated metal plate, which are supported by the ledges, *s s*. Now, if it is desired to bring the steam in direct contact with the meat, the stopcock is turned to admit it into the oven, or if desired, it can be shut off. The pipes, D D, are protected from the juice of the meat or other substance by the caps, *o o*, placed a short distance above them, so as to allow the steam to escape under the caps. On the tops of the ovens are the seats, G G, for vessels for boiling food, and the steam is admitted directly against the bottoms of these or shut off at pleasure by turning the stopcock, H. The water may be drawn off by the stopcock, I, and a safety valve guards against explosions.

Fig. 1

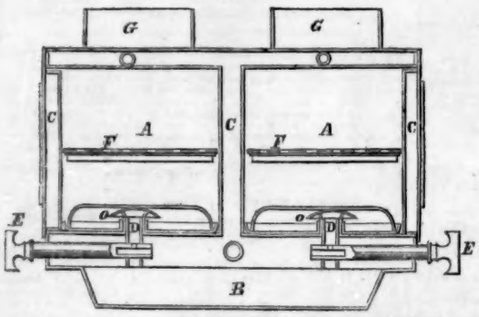
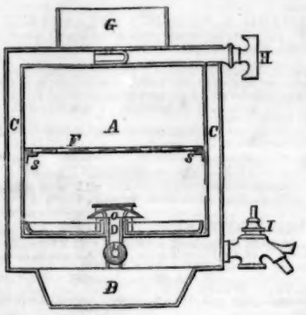


Fig. 2



DEVENDORF'S IMPROVED STEAM COOKER.

This apparatus was invented by L. B. Devendorf, of Cedarville, N. Y., who has applied for a patent on the same through the Scientific American Patent Agency.

ENGLISH RAILROADS.

The railroads of Great Britain and Ireland, completed at the beginning of 1856, extended 8,054 miles, and more than enough of single rails were laid to make a belt around the globe. The cost of constructing these railroads had been £286,000,000. The working stock comprised 5,000 locomotive engines and 150,000 carriages and trucks; and the coal consumed annually by the engines amounted to 2,000,000 tuns; so that, in every minute, 4 tuns of coal flashed into steam 20 tuns of water. In a single year, there were 111,000,000 of passengers conveyed on railroads, each passenger traveling an average of 12 miles. The receipts during the year amounted to £20,215,000; and there was no instance on record in which the receipts of a railroad had not been of continuous growth, even where portions of the traffic had been abstracted by new lines. The wear and tear of the railroads was, at the same time, enormous. For instance, 20,000 tuns of iron rails required to be annually replaced, and 26,000,000 of wooden sleepers perished in the same time. To supply this number of sleepers, 300,000 trees were felled, the growth of which would require little less than 5,000 acres of forest land. The cost of running was 15 pence per mile. Tunnels, of a size never before contemplated, have penetrated for miles through hard rocks, or through shifting clays and sands, in order to admit of the construction of these railroads; embankments and viaducts have been raised and erected on a scale of magnificence surpassing any former similar works; bridges of various novel kinds, invented and constructed for the special occasions, carry the railroads over straits of the sea, through gigantic tubes—across rivers, suspended from rods supported by ingeniously devised piers and girders—and over slanting roads on iron beams, or on brick arches built askew.

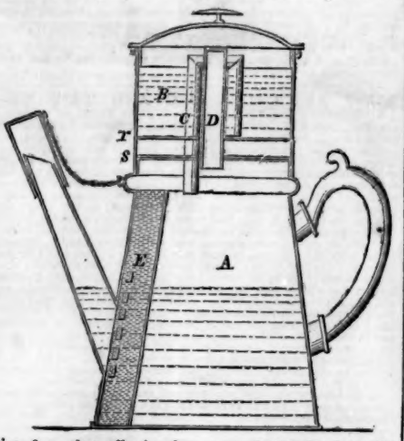
RAILROAD CATASTROPHES.

A way train ran into the Albany express train, on the Hudson River Railroad on the afternoon of the 18th inst. One lady, just a few hours married, was killed, and several others badly wounded. The express train had stopped to repair the engine, and the conductor used no means to warn the approaching train of his position. It was by the most stupid and reckless conduct that this accident was caused. On the same day one train ran into another in a like manner, on the Harlem Railroad, and several persons were also wounded in this case. The reason why so many accidents take place on our railroads, is owing to their want of system in management and the immunity of guilty parties from punishment. The train on the Hudson River Railroad which ran into the other was only 10 minutes behind it in starting.

DEVENDORF'S COFFEE POT.

The splendid success of the "Old Dominion Coffee Pot" seems to be stimulating inventors to enter into competition for a share of the profits on this useful article. The annexed cut illustrates an improvement, the object of which is to prevent the condensing water from becoming heated by the steam.

The pot, A, is made of the usual form and is surmounted by the condenser, B, which is filled with cold water for the purpose of condensing the vapor which



arises from the coffee in the pot, and restoring it to the pot along with the aroma of the coffee with which it is filled. The condenser is provided with two bottoms, *r* and *s*, and the space between them communicates, by means of holes, with the open air, thus shielding the cold water in the condenser from contact with the hot steam in the pot. The vapor is carried up into the condenser by the pipes, C and D, one of which, C, is bent in the form of a siphon, and has the lower end of its short arm open to communicate with the cold water in the condenser. As the steam arises in the pot it passes into the pipes, C and D, and is condensed by the cold water which surrounds them, and flows back into the pot, thus restoring the aroma to the beverage instead of carrying it over the house.

Another peculiarity of this pot is the strainer, E, which is made to slide in parallel guides so that it may be withdrawn from the pot to be cleaned, being curved to fit pretty near the sides of the pot, and perforated with small holes.

An application for a patent has been made on this invention, through the Scientific American Patent Agency. Persons desiring further information may address the inventor, L. B. Devendorf, Cedarville, N. Y.